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TRANSACTIONS

OF THE

AMERICAN CLIMATOLOGICAL ASSOCIATION.

FOR THE YEAR 1906.

VOLUME XXII.

"The object of this Association shall be the study of Climatology and Hydrology and of Diseases of the Respiratory and Circulatory Organs."—*Constitution.*

PHILADELPHIA:
PRINTED FOR THE ASSOCIATION.
1906.

NOTICE.

The Association assumes no responsibility for the statements and opinions expressed in the papers read at its meetings.

Copies may be had of the Secretary.

Vols. XXI and XXII contain a complete general index of all the volumes.

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1906.

PRESIDENT.

E. L. SHURLY, M.D., DETROIT.

VICE-PRESIDENTS.

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REPRESENTATIVE TO THE EXECUTIVE COMMITTEE OF THE CONGRESS OF AMERICAN PHYSICIANS AND SURGEONS.

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1907.

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CONTENTS.

	PAGE
List of Officers, 1906	iii
List of Officers, 1907	iv
List of Officers, 1884–1907	vii
List of Members	ix
Minutes	xv

President's Address. By E. L. Shurly, M.D	1
A Plea for the Systematic Study of Climatology in the Medical Schools. By Henry P. Loomis, M.D.	7
St. Moritz, Engadine. By Arnold C. Klebs, M.D.	15
The Irish Riviera. By Charles E. Nammack, M.D.	26
The Action of the Waters of Fiuggi, Italy. By Carlo Colombo, M.D.	34
Temperature and Sunshine in Lakewood, New Jersey, 1900–1905. By W. G. Schauffler, M.D.	48
Administrative Control of Cerebrospinal Meningitis in New York City. By Thomas Darlington, M.D.	56
Some Forms of Acute Cardiac Dilatation. By Beverley Robinson, M.D.	71
The Tachycardia of Early Pulmonary Tuberculosis. By Wm. M. Gibson, M.D.	96
Heart Block—Case and Autopsy. By Glentworth R. Butler, M.D.,	102
Artificial Nauheim Baths in Chronic Heart Cases. By Philip King Brown, M.D.	108
The Influence of Barometric Pressure on Nephritis. By Henry Sewall, M.D.	117
The Rational Treatment of Visceral Ptoses. By J. Madison Taylor, M.D.	127
Balneology in Relation to Renal Disease By Charles C. Ransom.	141
The Hot Morning Bath. By Norman Bridge, M.D.	166
Light—Radiant Energy. By W. Duffield Robinson, M.D.	172
Metabolism and Climate. By Boardman Reed, M.D.	180
The Apical Outline as an Aid to Diagnosis in Pulmonary Tuberculosis. By C. L. Minor, M.D.	185

PAGE

The Value of "Splitter" in the Diagnosis of Some Doubtful Cases of Pulmonary Tuberculosis. By F. M. Pottenger, M.D . 193

Temperament of the Individual an Important Factor in Deciding the Location of a Case of Tuberculosis. By W. C. Glasgow, M.D. 199

Esculapian Health Resorts. By R. G. Curtin M.D., . . . 204

The Care of Far Advanced Cases of Pulmonary Tuberculosis. By S. G. Bonney, M.D. 215

Study of a Diphtheria Epidemic in the Adirondack Cottage Sanitarium. By Lawrason Brown, M.D.; A. H. Allen, M.D., and E. J. S. Lupton, M.D. 240

Deep Breathing as a Therapeutic and Preventive Measure in Certain Diseases of the Lungs. By John H. Pryor, M.D. . . 251

The Fresh-Air Treatment of Acute Respiratory Diseases with Especial Reference to Pneumonia. By James M. Anders, M.D. 262

The State Segregation of Consumptives. By R. A. Cleemann, M.D. 274

The Mortality from Tuberculosis in the Neighborhood of Sanatoriums. By J. H. Elliott, M.B. 280

Empyema of Long Standing; Operation; Recovery. By I. H. Hance, M.D. 287

S. EDWIN SOLLY, M.D., M.R.C.S.
President, 1895. Died Nov. 19, 1906.

LIST OF OFFICERS.

Presidents.

NAME.	YEAR.
A. L. Loomis	1884–5.
William Pepper	1886.
Frank Donaldson	1887.
A. L. Loomis	1888.
V. Y. Bowditch	1889.
Charles Denison	1890.
F. I. Knight	1891.
W. E. Ford	1892.
R. G. Curtin	1893.
A. H. Smith	1894.
S. E. Solly	1895.
J. B. Walker	1896.
E. Fletcher Ingals	1897.
E. O. Otis	1898.
Beverley Robinson	1899.
Abraham Jacobi	1900.
Robert H. Babcock	1901.
Samuel A. Fisk	1902.
Norman Bridge	1903.
James C. Wilson	1904.
W. F. R. Phillips	1905.
E. L. Shurly	1906.
Thomas Darlington	1907.

Vice-Presidents.

F. I. Knight, W. H. Geddings	1884–5.
Frank Donaldson, Beverley Robinson	1886.
V. Y. Bowditch, R. G. Curtin	1887.
A. Y. P. Garnett, J. T. Whittaker	1888.
J. R. Leaming, E. T. Bruen	1889.
A. L. Gihon, H. B. Baker	1890.
E. L. Trudeau, T. S. Hopkins	1891.

E. Fletcher Ingals, Beverley Robinson	1892.
A. H. Smith, E. O. Otis	1893.
I. Hull Platt, E. L. Trudeau	1894.
John H. Musser, G. R. Butler	1895.
Charles E. Quimby, James A. Hart	1896.
S. A. Fisk, John C. Munro	1897.
Beverley Robinson, C. F. McGahan	1898.
James A. Hart, R. C. Newton	1899.
R. H. Babcock, J. W. Brannan	1900.
Albert C. Peale, S. W. Langmaid	1901.
Norman Bridge, W. F. R. Phillips	1902.
James C. Wilson, H. S. Orme	1903.
Thomas Darlington, Thomas D. Coleman	1904.
S. G. Bonney, S. D. Risley	1905.
A. D. Blackader, Henry Sewall	1906.
Frank Fremont-Smith, C. L. Minor	1907.

Secretaries and Treasurers.

James B. Walker	1884–95.
Guy Hinsdale	1895–

LIST OF MEMBERS

Honorary Members.

ELECTED

1905. Bell, A. N., 337 Clinton Street, Brooklyn, New York.
1905. Schauffler, Edward W., Kansas City, Missouri.
1906. Trudeau, Edward L., Saranac Lake, New York.
1903. Tyndale, J. Hilgard, Richards Block, Lincoln, Nebraska.
1897. Weber, Sir Hermann, 10 Grosvenor Street, W., London, England.
1906. Weber, Leonard, 25 West 46th Street, New York.
1897. Williams, Charles Theodore, 2 Upper Brook Street, W., London, England.

Corresponding Members.

1906. Colombo, Carlo, via Plinio, Rome, Italy.
1898. Eyre, G. G., Claremont, Cape Town, South Africa.
1898. Gache, Samuel, 729 Corrientes Street, Buenos Ayres, South America.
1898. Liceaga, Eduardo, 4 San Andres Street, Mexico.
1898. Orvananos, Domingo, 25 Chavarri Street, Mexico.
1904. Sandwith, Fleming Mant, 31 Cavendish Square, London, and Cairo, Egypt.
1898. Sunderland, Septimus, 11 Cavendish Place, Cavendish Square, W., London.
1902. Weber, F. Parkes, 19 Harley Street, W., London.

Active Members.

1888. Abbot, Griffith E., Leominster, Mass.
1897. Alton, Charles D., 86 Farmington Avenue, Hartford, Conn.
1898. Anders, Howard S., 1836 Wallace Street, Philadelphia.

ELECTED

1899. Anders, James M., 1605 Walnut Street, Philadelphia.
1890. Anderson, B. P., 106 N. Cascade Avenue, Colorado Springs, Colorado.
1900. Arnold, Horace D., 427 Beacon Street, Boston.

1893. Babcock, R. H., 92 State Street, Chicago.
1898. Baldwin, Edward R., Saranac Lake, N. Y.
1901. Barlow, W. Jarvis, Hellman Building, Los Angeles, Cal.
1898. Battle, S. Westray, Asheville, N. C.
1902. Bergtold, William H., 1460 Clayton Street, 610 California Building, Denver, Col.
1905. Biggs, Hermann M., 5 West 58th Street, New York City.
1906. Billings, John S., Jr., 32 East 53d Street, New York City.
1897. Blackader, Alexander D., 236 Mountain Street, Montreal, Canada.
1895. Boardman, W. S., 63 Mt. Vernon Street, Boston.
1897. Bonney, S. G., Stedman Building, Denver, Col.
1885. Bowditch, V. Y., 506 Beacon Street, Boston.
1901. Bracken, Henry Martyn, 1010 Fourth Street, Minneapolis, Minn.
1891. Brannan, John W., 11 West 12th Street, New York City.
1894. Bridge, Norman, 217 South Broadway, Los Angeles, California.
1903. Brown, Lawrason, Saranac Lake, New York.
1903. Brown, Philip King, 2527 Fillmore Street, San Francisco, California.
1897. Brown, Sanger, Reliance Building, Chicago.
1890. Buckley, J. J., Missoula, Mont.
1886. Butler, G. R., 229 Gates Avenue, Brooklyn.

1896. Campbell, W. A., 424 N. Nevada Ave., Colorado Springs, Colorado.
1898. Casselberry, W. E., 34 Washington Street, Chicago, Ill.
1898. Chappell, Walter F., 7 East 55th Street, New York.
1906. Claytor, Thomas A., 1315 New Hampshire Avenue, Washington, D. C.
1898. Cleemann, Richard A., 2135 Spruce Street, Philadelphia.
1901. Cobb, J. O., U. S. M. H. S., Los Angeles, Cal.
1894. Coleman, Thomas D., 563 Greene Street, Augusta, Ga.
1901. Collins, Charles Farnham, 50 West 55th Street, New York.

ELECTED

1889. Coolidge, A., Jr., 613 Beacon Street, Boston.
1902. Craig, R. W., Phœnix, Arizona.
1885. Curtin, R. G., 22 South 18th Street, Philadelphia.

1892. Daland, Judson, 317 South 18th Street, Philadelphia.
1890. Darlington, Thomas, Cor. 55th Street and Sixth Ave., New York City.
1897. Davis, N. S., Jr., 65 Randolph Street, Chicago.
1906. Dawson, John L., Charleston, S. C.
1884. Denison, Charles, 823 14th S reet, Denver, Col.
1902. Duffield, William, Los Angeles, California.
1905. Dunn, William LeRoy, Asheville, N. C.

1897. Edson, Carroll E., McPhee Building, Denver, Col.
1903. Edwards, William A., Braly Building, Los Angeles, Cal.
1903. Elliott, J. H., Gravenhurst, Ontario, Canada.
1892. Elsner, H. L., Fayette Park, Syracuse, N. Y.

1887. Fisk, Samuel A., Brimfield, Mass.
1902. Flint, W. H., Santa Barbara, Cal.
1885. Ford, Willis E., 266 Genesee Street, Utica, N. Y.
1906. French, Samuel W., 1216 Grand Avenue, Milwaukee, Wis.
1897. Futterer, Gustav, 34 Washington Street, Chicago.

1896. Gardiner, C. Fox, 818 North Cascade Avenue, Colorado Springs, Col.
1886. Garnett, A. S., Hot Springs, Ark.
1898. Getchell, Albert C., 6 Linden Street, Worcester, Mass.
1892. Gibson, William M., 260 Genesee Street, Utica, N. Y.
1884. Glasgow, W. C., 4500 Olive Street, St. Louis.
1901. Guthrie, George W., 109 South Franklin Street, Wilkesbarre, Pa.

1893. Hance, I. H., Lakewood, N. J.
1891. Hart, James A., Geneva, New York.
1900. Harvey, Thomas W., 463 Main Street, Orange, N. J.
1896. Heffron, John L., 528 South Salina Street, Syracuse, N. Y.
1893. Hinsdale, Guy, Hot Springs, Va.
1902. Hoagland, Henry W., 327 North Nevada Avenue, Colorado Springs, Col.
1905. Huddleston, John H., 126 West 85th Street, New York City.

ELECTED

1884. Ingals, E. Fletcher, 34 Washington Street, Chicago.

1889. Jacobi, A., 19 East 47th Street, New York.
1904. Jacobs, Henry Barton, 11 Mt. Vernon Place, W., Baltimore.
1888. Jayne, W. A., 416 McPhee Building, Denver, Col.
1901. Jennings, Charles Godwin, 457 Jefferson Street, Detroit, Michigan.
1897. Johnson, Frank S., 2521 Prairie Avenue, Chicago.

1904. King, Herbert Maxon, Liberty, New York.
1899. Klebs, Arnold C., 100 State Street, Chicago.
1884. Knight, Frederick I., 195 Beacon Street, Boston.
1903. Kyle, D. Braden, 1517 Walnut Street, Philadelphia.

1887. Langmaid, S. W., 71 Newbury Street, Boston.
1899. Le Fevre, Egbert, 52 West 56th Street, New York.
1903. Lindley, Walter, 1414 South Hope Street, Los Angeles, California.
1904. Little, Wilbur T., Canon City, Col.
1896. Loomis, Henry P., 58 East 34th Street, New York.
1904. Lowman, John H., 441 Prospect Street, Cleveland, O.
1902. Lyle, B. F., 19 W. 7th Street, Cincinnati, O.

1902. McBride, James H., Pasadena, Cal.
1894. McGahan, C. F., Aiken, S. C., and Bethlehem, N. H.
1906. Manges, Morris, 72 East 79th Street, New York.
1902. Marvel, Philip, 1616 Pacific Avenue, Atlantic City, N. J.
1887. Mays, Thomas J., 1829 Spruce Street, Philadelphia.
1905. Miller, James Alexander, 550 Park Ave., New York City.
1899. Minor, Charles L., Asheville, N. C.
1886. Musser, John H., 1927 Chestnut Street, Philadelphia.

1900. Nammack, Charles E., 42 East 29th Street, New York.
1895. Newton, R. C., 42 Church Street, Montclair, N. J.
1899. Norrie, V. H., 21 West 37th Street, New Yo k.
1888. Nunn, Richard J., 5 York Street, E., Savannah, Ga.

1884. Orme, H. S., 214 Douglas Building, Los Angeles, Cal.
1888. Otis, E. O., 381 Beacon Street, Boston.

1887. Peale, A. C., 605 12th Street, N. W., Washington, D. C.
1906. Perkins. Jay, 106 Waterman Street, Providence, R. I.

ELECTED

1895. Phillips, W. F. R., 1607 16th Street, N. W., Washington, D. C.
1885. Platt, Isaac Hull, Wallingford, Pa.
1887. Platt Walter B., 802 Cathedral Street, Baltimore.
1902. Pottenger, F. M., O. T. Johnson Building, Los Angeles, California.
1905. Pratt, Joseph H., 143 Newbury Street, Boston.
1905. Pryor, John H., 26 Linwood Ave., Buffalo, New York.

1891. Quimby, Charles E., 44 West 36th Street, New York.

1891. Ransom, C. C., 66 W. 49th Street, New York.
1884. Reed, Boardman, Union Trust Co. Bldg., Los Angeles, California.
1885. Rice, C. C., 123 East 19th Street, New York.
1901. Richardson, Charles W., 1317 Connecticut Avenue, Washington, D. C.
1904. Richer, A. J., 87 Union Avenue, Montreal, Canada.
1893. Risley, S. D., 1728 Chestnut Street, Philadelphia.
1899. Rives, William C., 1702 Rhode Island Ave., Washington, D. C.
1884. Robinson, Beverley, 42 West 37th Street, New York.
1890. Robinson, W. D., 2012 Mount Vernon Street, Philadelphia.
1902. Rochester, Delancey, 469 Franklin Street, Buffalo, N. Y.
1892. Roe, John O., 28 North Clinton Street, Rochester, N. Y.
1890. Rogers, E. J. A., 222 Colfax Avenue, Denver, Col.
1889. Ruck, Carl von, Asheville, N. C.

1905. Schauffler, William Gray, 400 Madison Ave., Lakewood, New Jersey.
1901. Sewall, Henry, 433-4 Majestic Building, Denver, Col.
1884. Shurly, E. L., 32 Adams Avenue, W., Detroit, Mich.
1890. Smith, A. Alexander, 18 West 51st Street, New York.
1887. Smith, Frank Fremont, 1808 Massachusetts Ave., Washington, D. C.
*1887. Solly, S. E., 2 North Cascade Avenue, Colorado Springs, Colorado.
1900. Stengel, Alfred, 1811 Spruce Street, Philadelphia.
1904. Stone, Arthur K., 543 Boylston Street, Boston, Mass.

*Deceased.

ELECTED

1898. Stubbert, J. Edward, 56 West 46th Street, New York.
1901. Swan, Will Howard, 706 North Nevada Avenue, Colorado Springs, Col.

1892. Taylor, H. Longstreet, 75 Lowry Arcade, St. Paul, Minn.
1896. Taylor, J. Madison, 1504 Pine Street, Philadelphia.

1884. Walker, James B., 1617 Green Street, Philadelphia.
1891. Watson, E. W., 131 North 20th Street, Philadelphia.
1897. Whitcomb, H. H., Norristown, Pa.
1898. Whitney, Herbert B., 726 14th Street, Denver, Col.
1904. Wilder, John Archibald, Stedman Building, Denver, Col.
1898. Williams, Francis H., 505 Beacon Street, Boston.
1885. Williams, H. F., 197 Gates Avenue, Brooklyn.
1898. Williams, Harold, 528 Beacon Street, Boston.
1884. Wilson, James C., 1509 Walnut Street, Philadelphia.
1901. Wyman, Walter, Surgeon-General, U. S. Public Health and Marine Hospital Service, Washington, D. C.

Total, 143 active members.

MINUTES.

The Twenty-third Annual Meeting of the American Climatological Association was called to order by the President, Dr. E. L. Shurly, of Detroit, at the Marlborough-Blenheim, Atlantic City, N. J., on May 12, 1906, at 10 A.M.

The following members were present or attended the later sessions:

Dr. Griffith E. Abbot,
Dr. Howard S. Anders,
Dr. James M. Anders,
Dr. R. H. Babcock,
Dr. A. D. Blackader,
Dr. E. R. Baldwin,
Dr. S. G. Bonney,
Dr. Francke Bosworth,
Dr. H. M. Bracken,
Dr. G. R. Butler,
Dr. W. A. Campbell,
Dr. R. A. Cleemann,
Dr. T. D. Coleman,
Dr. R. G. Curtin,
Dr. Judson Daland,
Dr. Thomas Darlington,
Dr. J. H. Elliott,
Dr. Wm. M. Gibson,
Dr. I. H. Hance,
Dr. Guy Hinsdale,
Dr. H. M. King,
Dr. A. C. Klebs,
Dr. D. Braden Kyle,
Dr. Henry P. Loomis,
Dr. C. F. McGahan,
Dr. Philip Marvel,
Dr. Charles L. Minor,
Dr. V. H. Norrie,
Dr. W. F. R. Phillips,
Dr. F. M. Pottenger,
Dr. Joseph H. Pratt,
Dr. J. H. Pryor,
Dr. C. C. Ransom,
Dr. Boardman Reed,
Dr. S. D. Risley,
Dr. Beverley Robinson,
Dr. W. D. Robinson,
Dr. W. G. Schauffler,
Dr. Henry Sewall,
Dr. E. L. Shurly,
Dr. F. Fremont Smith,
Dr. J. Madison Taylor,
Dr. James B. Walker,
Dr. H. H. Whitcomb,
Dr. J. C. Wilson.

Guest: Dr. Thomas Hiland, Lt.-Commander, U. S. N., Retired.

The scientific session adjourned at 12.15 P.M. The Association immediately met in business session.

The roll call and the reading of the minutes were dispensed with. The Secretary and Treasurer's report was then read.

Report of the Secretary and Treasurer.

The Association enters upon its Twenty-third Annual Meeting with a membership of 140. One member, Dr. E. P. Bernardy, of Philadelphia, died during the past year. Dr. Bernardy was elected just ten years ago. He was present at the last meeting held in Philadelphia, but died in Atlantic City after a long illness from Bright's disease, September 13, 1905. He was a man of high attainments and had the respect of the profession. One of our members is now lying ill in his own sanitarium in Colorado Springs—our beloved Dr. Solly.

Financial Statement.

Balance on hand June 29, 1905	$12 61
Cash received	1189 50
	$1202 11
Expenses:	
W. J. Dornan	199 03
Lea Bros. & Co.	6 50
Richmond & Backus	483 80
Use of Illustrations	8 75
Amer. Com. XV International Congress	25 00
Reporting	26 00
Other expenses	234 00
Total expenses	983 08
Balance on hand May 10, 1906	219 03
Total	$1202 11

Vol. XXI of the TRANSACTIONS has been printed and distributed to members of all grades and to about eighty-three libraries and journals in the United States and abroad.

The late appearance of the TRANSACTIONS was due to several causes. One of these was the failure to receive the papers from members. From three to six months sometimes elapse before the papers, most important to the proceedings, will be handed in. Another delay was due to a strike in the printing offices. This was the principal cause of delay.

Less than a month ago the Secretary received a letter from Dr. Philip King Brown of San Francisco saying that he would attend our meeting and would be ready to read his paper already promised. The following day earthquake and fire destroyed the city. The Secretary immediately wrote to the doctor expressing on behalf of the Association our sympathy and asked for the safety of himself, his household, and his home and library. The following reply was received:

"Thanks for your kind note of sympathy. I am sorry not to be with you, but we escaped only with clothes, food, and bedding, and I must remain and work. I lost my paper, but saved my records and a few of the charts of my heart cases. These I am sending with the re-written paper to you, care of The American Climatological Association, Atlantic City. My library went and with it a set of the Association reports. Many, many thanks about offer to replace books. I would gladly pay freight charges on all the books I can get. Nearly every medical book in town was burned."

The Secretary then made some recommendations as to sending books and instruments and said that probably a committee could attend to the matter most effectively.

The following publications are received in exchange:

Archives of Medicine, St. Louis.
Archives of Physiological Therapy.
Medical Bulletin.
Monthly Cyclopedia of Practical Medicine.
Therapeutic Gazette, Detroit.
Chicago Clinic and Pure Water Journal.
Bulletin of the American Academy of Medicine.
Colorado Medical Journal.
Index Catalogue, S. G. O., Washington.
Pennsylvania Medical Journal.
Pennsylvania and New Mexico Weather Service Reports.
Southern California Medical Practitioner.
St. Louis Medical Review.
Bulletin of the Royal Academy of Medicine, Belgium.
Journal of the Balneological and Climatological Society, London.
Transactions of the Royal Academy of Medicine, Rome.
Review of the Academy of Science, Madrid.

It was moved and seconded that a telegram be sent to Dr. Solly; the telegram to be composed and sent by the President and Secretary. Carried.

Dr. Coleman and Dr. Bonney were appointed an Auditing Committee.

Drs. Curtin, Walker, B. Robinson, Babcock, and Phillips were appointed the Nominating Committee.

The Secretary's report was accepted.

The report of the Council was accepted.

It was moved, seconded, and carried, that the report of the Secretary be referred to a committee to take such action as they deem proper and to present their conclusions to the Association on the Monday following.

The following committee was then appointed: Drs. Phillips, McGahan, and Hinsdale.

The Association adjourned at 12.45 P.M.

The afternoon session was called to order by the President, Dr. Shurly, at 2.45 P.M., May 12.

The President announced that one of our members had brought a message from the British Medical Association inviting this Association to its meetings in Toronto, in August, as its guests:

Dr. J. H. Elliott, Gravenhurst, Ontario, Canada: "Before leaving Toronto one of the Secretaries asked me to make sure that the American Climatological Association had received their invitation to attend the meeting in August. All the societies composing the Congress are invited as guests. The address in medicine will be delivered by Sir James Barr; on Surgery, by Victor Horsley; on Gynecology, by Dr. Griffiths. Sir William Broadbent, Clifford Allbutt, and James Mackenzie, of Burnley, England, will be present."

The President, Dr. Shurly, thanked the British Medical Association for the American Climatological Association.

The Association convened in business session at 12.11 P.M.

It was moved, seconded, and carried that the Association be photographed.

The report of the Auditing Committee was adopted.

The Nominating Committee presented the following ticket for officers of the Association for the ensuing year:

President, Dr. Thomas Darlington, of New York.

Vice-Presidents, D. F. Fremont-Smith, of Washington, and Dr. C. L. Minor, of Asheville.

Secretary and Treasurer, Dr. Guy Hinsdale, of Hot Springs, Va.

Councillor, Dr. E. L. Shurly, of Detroit.

The next meeting to be held in Washington, D. C., May 7, 8, and 9, 1907.

For *Representative* to the Executive Committee of the VIIth Congress, Dr. F. I. Knight, of Boston; and for alternate, Dr. R. G. Curtin, of Philadelphia.

The Secretary was instructed to cast a ballot for the election of all the officers named.

Drs. Phillips, Fremont-Smith, Richardson, Peale, Rives, Wyman, and Claytor were named on the local Committee of Arrangements.

Drs. E. L. Trudeau and Leonard Weber were elected honorary members. Dr. Carlo Colombo, of Rome, was elected to corresponding membership.

Drs. John S. Billings, Jr.; Thomas A. Claytor, John L. Dawson, Morris Manges, Jay Perkins, and S. W. French were elected to active membership.

Dr. Phillips: The committee appointed has considered the Secretary's recommendations as to the publication of the volume of the TRANSACTIONS. The committee is unanimous that the Secretary make arrangements to have it published abroad. As to the question of what the Association should do in regard to the San Francisco profession, we think we should express our sympathy, leaving it to the American Medical Association to take action looking toward pecuniary relief. It was moved that this report be adopted. Carried.

It was moved and carried that Dr. A. Jacobi be sent the greetings of the Association.

It was also moved and carried that the Secretary be instructed to convey to Dr. Marvel and the Committee of Arrangements, and to the hotel management, our thanks. Carried.

The meeting adjourned at 12.50 P.M.

ADDENDUM.

Dr. Charles H. Alden, U. S. A., who was elected a member in 1897, died in Pasadena, Cal., June 8, 1906, at the age of seventy years. General Alden was graduated from Brown University in 1856, and received the degree of M.D. from the Pennsylvania Medical College in 1858 and the honorary degree of M.D. from the University of Pennsylvania in 1901. Dr. Alden entered the U. S. Army as an Assistant Surgeon in June, 1860, and served until April 28, 1900, when he was retired, having reached the grade of Colonel and Assistant Surgeon-general. He was Ex-President of the U. S. Army Medical School and a member of various national societies. He took a deep interest in this Association, and contributed to our proceedings in 1901 and 1905.

PRESIDENT'S ADDRESS.

BY E. L. SHURLY, M.D.
DETROIT, MICHIGAN.

THOSE who were present at the last meeting of this Association will readily recall (if indeed it is not in mind now) the masterful discourse of my distinguished predecessor, Dr. Phillips, on the science of climatology. As a feeble supplement, it is my desire now to call attention to climatology particularly as a medical art, and the necessity for its continuous study.

Pursuant to history, medicine, as a particular department of learning, in its evolution towards a concrete science and art from its budding in the beds of the occult religions and philosophies of antiquity to the present time, has suffered many undulations and mutations; and like its congeners, religion and political economy, has from time to time been the captive of doctrine and imperious authority (or universal thought), and has had, like the Roman Empire, its Cæsars, its Charlemagnes, its Bonifaces, its Constantines, its Hildebrands, its Pope Johns, and its Ottos, to garner and press its exploits into sheafs of dependent empiricism or dogmatic mendacity. Yet despite all this trammelling of human intellect and individualism characteristic of ancient and mediæval times, it has always been about the first entity of learning to escape and resume the journey of progress; and among all its branches, *climatology* as an adjuvant therapy has generally maintained some sort of standing—notwith-

standing ofttimes nursed by superstitious Meccas. Indeed, she is one of the oldest therapeutic children of the family of medicine, for the ancients—the Chinese, the Chaldeans, Arabians, Persians, and Egyptians—practised the assignment of diseased persons to particular natural springs, or locations for out-of-door life. Even the open-air treatment of pulmonary tuberculosis, of which we boast to-day, was generally practised in ancient times. Although apparently holding such a place, it has been more as an empiric measure than a scientific art that climatology was recognised, until about fifty years ago, when "medical geography" became one of the classic departments of medical learning, since which time the study of meteorology, and its promotion and supervision by the Governments of civilised nations (foremost of which is our own) have greatly aided its progress and scientific elucidation. Besides this, the diffusion of population and the extensive intercourse between people of different localities have incited the study of climatic effects on various disease conditions.

Yet, notwithstanding all this, are we not yet somewhat ignorant of the *principles* of clinical climatology in relation to individualism, and are we not deficient in our laboratory investigations of air, water, and sunlight? Even with the facts and demonstrations at hand, we are still as much in the dark concerning the principles connecting these facts and demonstrations with the laws of disease and individual peculiarities as we are regarding the *rationale* of immunity, or the various stamps of primordial living protoplasm. The increase and change of population and alterations of human customs, the changes in topography incident to the utilisation of natural resources—especially the denudation of the surface of forests, the changes in soil, and insect-life—all serve toward the requirement of more study and observation concerning the relationship of disease.

Indeed, the influence of climate or locality on man cannot be wholly represented by the observations and comparisons of mean temperature or humidity. We know that there are other conditions, some of which we are probably ignorant of, which play an important part in either the development or repression of disease. We do not know as yet all the subtle effects of the sun's rays on the human economy. Undoubtedly there will soon be demonstrated specific elements of potency in sun-beams similar to the Roentgen ray, which may clear up many of the mysteries attending climatic or weather effects on man. For instance, who can explain why the exposure of a healthy person for a little while to an east wind on a river-bank, a hill, or in a baseball arena, will produce a sore throat (tonsillitis perhaps), even granted that pathogenic micro-organisms are present in the person's pharynx? A chilling of the surface will not explain it exactly, for a similar effect will not, as a rule, follow a plunge into a river, lake, or other body of cold fresh water. Again, think of the curious relationship of so-called articular or muscular rheumatism (now believed to be a bacilli-genetic disease) to vicissitudes of weather in certain localities? Mere dampness cannot be the cause, for in some parts of "the lake region" acute articular rheumatism is comparatively rare, while in some dry mountainous districts it is quite common. Again, if we study the curious pathogenic phenomena known as influenza in its relation to vicissitudes of weather, independently of the specific micro-organisms which are believed to be concerned in the causation of the disease, what do we observe? Suddenly and simultaneously perhaps with a cold wave or a peculiar storm, as it were, a large portion of a community may be attacked with one or other of the clinical forms of influenza, so simultaneously, and of such particular type, that it would seem impossible for time enough to have

elapsed for the incubation and spread of the disease by communicability alone, although the micro-organisms are probably in the throat. The same may be observed with regard to acute pneumonia suddenly following a spell of low temperature and humidity. Now what are the agencies allowing the germ activity? Again, note the change of climate and telluric influences in those districts where the abolishment of intermittent and remittent fever and acute dysentery has taken place—districts where these were the most prevalent endemic or zymotic diseases, and where the festive mosquito still lingers to serenade us. I mention these diseases because their decline and extinction ante-date the development of bacteriology and hygiene to their modern status of proficiency. Of course, it cannot be denied that the advancement of general hygienic conditions, such as improved drainage and water supply, have been a potent influence towards these results.

It cannot be said that the principles of climatology have yet been worked out to a practical development of the art. For instance, the assignment of A, B, or C, to a particular climate and environment cannot yet be made with proper exactitude, although undoubtedly it can be done with better acumen now than formerly, when every patient who needed a change of climate or scene was sent to Texas, Minnesota, California, Colorado, or some other place, according to caprice or fashion. Even nowadays are we not dropping too much into routines or fads? For example, open-air treatment *anywhere* for pulmonary diseases of all sorts? Or, mineral springs *anywhere* for chronic cardiac and kidney diseases? Is not the profession recommending this or that place or sanatorium without a careful study of the individual requirements of the case and the best fitted environment for such case? For instance, a health resort abounding in facilities for gambling and sports may be suitable, psychically,

to some patients of the idle, degenerate class, but will such a place be as suitable for physical repair; or, will an isolated ranch in the mountains, with splendid air, dust-free, sunshine, and equable temperature, suffice, if nought but a diet of blue corned beef, measly pork, and soggy bread be furnished for the patient's nutrition?

But it is unnecessary to multiply instances of misfitting environment to individual case requirements before this body of observers. I merely mention these things in order to emphasize the growing necessity of further attention towards the development of the climatologic art—which embraces the study of minute conditions, or changes of atmospheric, telluric, domestic, social and physical environment—including the animal and vegetable life of the region, and the comparative static and mutable conditions of both district and individual.

This association may be proud of its record. It has done much toward fostering and developing climatologic science and art, and although sometimes perhaps it may have lent its influences too much towards the study of pulmonary tuberculosis to the exclusion of the many other diseases quite as susceptible to climatic therapy, yet it has always been conservative and scientific. There are no hysterical enthusiasts, nor wheedling claquers for the popular ear, nor breezy promotors of popular crazes among its members. Yet it has given the widest scope of tolerance and opportunity to all, for the exploitation of ideas, as may be perhaps better expressed in the words of James Bryce, the historian, who says: "Everyone knows how little a man's actions conform to the general maxims which he would lay down for himself, and how many things there are which he believes without realising; believes sufficiently to be influenced, yet not sufficiently to be governed by them."

Still this glorious American Climatological Association

has much yet to do in the development of climatologic science and art. Its career should not be restricted to any one or two diseases, but should include the clinical climatic therapy and hygiene of every disease which may be affected by atmosphere, clouds, temperature, humidity, sun, and air effects, chemical and physiologic, as well as the land, the water, the fauna and flora of each district of our country. Its good work must go on side by side with the pathologist, the botanist, the zoologist, the chemist, the physiologist and geologist, so that we may be able to know with tolerable accuracy why we send a patient to this, that, or other place, or natural spring; and what effects may be counted upon by such and such sojourn and environment; and further, that we may learn why the anthrax bacillus, the tetanus bacillus, the streptococcus, which lurk in the soil everywhere, the typhoid bacillus, and the cholera spirillum, which lurk in the stagnant pools all about, are so innocuous under certain conditions of personal equation, and so pathogenic under other unknown conditions.

A PLEA FOR THE SYSTEMATIC STUDY OF CLIMATOLOGY IN THE MEDICAL SCHOOLS.

BY H. P. LOOMIS, M.D.
NEW YORK CITY.

No one, not coming directly into contact with the modern medical student, has any idea of the amount and varied kind of knowledge that is crammed into him from nine o'clock in the morning till five in the afternoon, during the eight months of the ordinary college course. It is so different from former student days—the lectures of which have been superseded by the section teaching—the simple laboratory classes by advanced courses in physiological chemistry, clinical microscopy, hygiene, bacteriology, &c. I have often questioned whether the students of to-day will make as good *practical* practitioners as their predecessors, and whether they will ultimately cure as many of their patients. Often, it seems to me, the study of physical diagnosis, the ordinary symptoms of disease, the treatment of the individual, are neglected for the minutiæ of blood examination, bacteriological technique, and the refinements of the specialists. In my opinion the modern medical student when he graduates, has been given more of specialised knowledge than he can properly assimilate. He is dazed, and spends the first five years of his practice in forgetting half he has been been taught. I feel strongly on this matter, and many other teachers I know feel as I do, asking, where shall the refinements of medical education end? Now, take the subject we are all interested in—

climatology. Shall we teach students of medicine climatology because the higher education of to-day demands it, and they should know all subjects of such practical importance, as they can make use of it in their every-day work, and so should receive instruction in this subject?

If this instruction is not given, how is the medical student, when he becomes a practising physician, going to get it? I should say, generally, by learning from his mistakes. He will wake up sooner or later to the fact that his reputation has received a bad set back, when some patient returns home to die after he has sent him away to recover, and has recommended some place which has turned out to have the very worst climatic conditions for that particular case. It may be a Bright's case he has sent to the cold and dampness of a mountain resort, or a tubercular case to the sea-shore, when it needs the stimulating dryness of the mountains. Rightly or wrongly, people do not forgive or forget these mistakes, and the physician has to take the blame for the bad results, so it behoves him to be careful; and again, no physician, when he has sent his patient to a particular resort, can wash his hands of the case and let his brother colleague at the health resort take the responsibility. So, from a purely practical point of view, I think the medical student should understand certain general principles of climate and the essential characteristics of the best known health resorts. We all know that in "change of climate" we have a medical agent in the treatment of a large class of diseases far more important than drugs. In the study of drugs and their application the medical student spends a large portion of his time. Why not give some time to this subject which will accomplish in many cases, when judiciously used, far more than drugs; but like every medical agent that is capable of great benefit, if injudiciously used it is capable of harm. When a patient is sent to a special climate we all know that the case does not stand still, he

returns either better or worse. Let the medical student study climatology as he would any other important branch of treatment; certainly it cures more patients every year than any other *one* remedy, if we consider all the tubercular cases. Let us impress upon the student the importance of individualising when he prescribes it; each case is to be studied not as one having a certain disease, which is ordinarily benefited by such and such a climate, but as an individual, with distinct temperament, inclinations and personal peculiar phases of the disease. The climatic treatment of pulmonary tuberculosis illustrates this point possibly better than any other disease. What sad mistakes and bad results we have all seen, where an individual who is especially influenced by environment, accustomed to social surroundings, good food and comfortable living, is sent far away from friends to an ideal resort, climatically, but lacking in all those surroundings that make life endurable. Some will rise above their surroundings in their fight for health, but many more succumb. I "do not believe that any one who has not tried to teach climatology" has any idea of the difficulties. In the first place, there is no book that I know of on climatology, with the exception of Solly, published in this country. Solly's is not adapted as a text-book, although very valuable as a reference work. Therefore, anything like a text-book is out of the question. To condense the subject, systematise the knowledge, and make it understandable and practical to the student, necessitates an immense amount of reading of monographs and desultory writings. No teacher can have personal knowledge of the great majority of climatic stations. He has not the time nor the opportunities to visit them all; and even if he did, and only remained a short time, the idea he could obtain would be subject a good deal to the weather conditions of the few days he was in the place, and he would judge hastily of its being stormy or pleasant, equable or changeable, mild or cold, according to his enforced limited experience.

How are we to obtain our information so that we can impart it to others? By reading books or monographs on special health resorts and their climatic advantages? How unreliable these are, and how coloured by personal considerations, we all know. I believe the ordinary physician obtains his most reliable information by the study of his patients, the results he sees from a residence in any special place, and what they tell him about the resort climatically and practically. And again, from meetings just such as this, where a number of men from all parts of the country come together and impart their personal knowledge of the climate conditions where they reside, and with which they are acquainted, and where they talk as friend to friend. To ascertain whether climatology is taught to-day as a distinct subject in the medical colleges of this country, I wrote a personal letter to the heads of the departments of therapeutics in ten of the most important schools, such as Harvard, Johns Hopkins, Chicago University and the College of Physicians and Surgeons in New York. Three questions were asked: (1) Whether climatology was taught as a distinct subject? (2) If not taught, whether the head of the department would consider it an advisable addition to the course? (3) If they knew of any book on this subject adapted for the use of medical students? Answers were received from all the colleges, and it was found that only in four was climatology taught as a distinct subject, namely, at the Jefferson Medical School in Philadelphia, where four lectures are given on this subject by Dr. Hare; at the Bellevue University Medical School of New York, where Dr. Le Fevre gives three lectures; M'Gill University of Montreal, where Dr. Blackader gives two or three lectures, and the Cornell Medical School of New York, where the writer gives three lectures. The heads of the department of therapeutics in two of the remaining six medical colleges

reported that they would consider a number of lectures on climatology advisable. One of the two writers modified this statement by saying, "If given without replacing other more important subjects." All of the writers, with the exception of Dr. Hare, of Philadelphia, report that they know of no book on climatology suitable to place in the hand of the medical student. Dr. Hare recommends Solly's "Medical Climatology," and a book on American Climatology by Williams, of London. Dr. Blackader speaks highly of a new book by Huggard. Many of the writers reported that the subject of climatology is considered at the clinics in connection with the treatment of special diseases, such as tuberculosis. While I only wrote to ten medical schools, I consider, as they were the more important, their instruction would be most complete, and I believe practically the same answer would have been received to my enquiries had I written to thirty or forty of the smaller colleges. As a result of these enquiries, one may conclude that to-day the subject of climatology is not considered of sufficient importance to demand special instruction, and on this point I wish to take exception. I believe it is important for the following reasons :—

(1) As an essential part of the most liberal general medical education, and its practical importance is fully as great, if not more so, than the instruction given in a large number of the technical courses.

(2) The young medical student, when he begins his practice, may not be called upon to treat cases who are financially able to undertake a change of climate, but very soon, if successful in some important case, the subject will be brought to his attention, and his ability to decide rightly will reflect upon or mar his professional standing.

(3) The fact will be impressed upon him, as he practises medicine, that many of his chronic cases, which are showing

no improvement, will most probably respond quickly and favourably to change of climate and residence in a suitable locality, but he must be able to *choose the climate judiciously*.

(4) The fact should be impressed upon the student that change of climate alone will not produce the change desired in many cases without the physician directing that his patient put himself under the care of some physician living in and acquainted with the peculiarities of the place to which he has been sent. This we all recognise as a very important point in reference to the climatic treatment of tuberculosis, and if remembered by the general practitioner, the bad advice so often heard where the family physician has told his patient to go to a certain health station, and that he needs no medical care, the climate will do everything, is an extraordinary tribute to climate and a confession of ignorance as to its limitations. It may not be out of place to call attention of the members of this Association to a plan which I personally follow when teaching this subject at the Cornell University Medical College. While this may not be the best way of presenting the subject to the medical student, still I think it is eminently practical. I divide my lectures into four heads :—

(1) The consideration of the general subject of climatology and the consideration of the physiological conditions which modify it. I do not go into this portion of the subject scientifically, but take it up purely from the practical side, giving the general effects of the well-known physical conditions upon the climate of any given locality.

(2) I endeavour to give such a practical classification of climate as will furnish the student a working basis. There are many ways of classifying climate ; this one, in my opinion, is best.

(3) I briefly consider the peculiarities of the climatic conditions, surroundings and accommodations for patients

at the well-known health resorts of the United States, using a large contour map of the United States. The time of year in which the climatic conditions of the different resorts are most favourable, the number of sunny days, and the soil and wind conditions are taken up.

(4) A detailed consideration of the climatic treatment of the most prominent diseases influenced by climate is then considered; special localities which offer favourable conditions are considered in detail, and their effects upon the different classes of disease noted. Naturally the subject of tuberculosis is gone into in detail, especially the class of cases which are usually benefited at high, medium, or low altitudes. I believe the next five years will show a marked change in the position which the subject of climatology will occupy in the curriculum in our medical colleges. The paramount and increasing interest in the subject of tuberculosis will be an important factor in bringing about this result.

DISCUSSION.

Dr. W. F. R. PHILLIPS (Washington): We are to be congratulated on this valuable paper with the outline so clearly drawn. Dr. Loomis has given us the outline and we can very well follow it. Climatology is deserving of more attention in the medical schools, as we deal daily with things that are climatic. The climatic influence is a strong one, and we ought to know how it will affect the organism. The main difficulty seems to hinge on our ignorance of what goes to make up the weather or climate. In teaching climatology to students we have to teach empirically and from clinical observations. We want more light on the subject and we must study it more and more, then we will be more likely to find out things of importance.

Dr. J. C. WILSON (Philadelphia): The profession and the members of this Society are under an obligation to Dr. Loomis for his valuable paper. This sort of work is of very great importance; the subject as presented would serve as a syllabus for a teacher and would enable him to make the subject much more clear. Speaking as a teacher of practice, I have a word to say with regard to the place this subject occupies in the curriculum. To

a certain extent it must be looked upon as a part of therapeutics. Those who have to do with the arrangement of the curricula are brought face to face with the subjects relating to the advance of the medical student, and the question arises what time can be given to teaching certain special subjects, and the fitness of the student to understand it. Speaking of the experience of Jefferson College, it will be necessary to recognise a post-graduate year which will enable the curriculum to be extended in the particular departments, and the subjects can be given to the students who are qualified. I do not see how proper time can be given to this subject in any school within four years. There is one aspect which has been too little dwelt upon, and that is regarding the individual patient. Very often it is less a question of climate to which he is to be sent, as the climate from which he is to be taken. It is the change of the climate and environment to more favourable conditions in another region that forms an important subject.

Dr. Guy Hinsdale (Hot Springs): In the data given in Dr. Loomis's valuable paper George Washington University, Washington, and the Medico-Chirurgical College of Philadelphia might have been mentioned. I gave four lectures on this subject in the latter college last January and they seemed to be much appreciated, and it was decided to have lectures on this subject. It is extremely difficult to embrace the subject in four lectures each year. It is best, if you can get an opportunity, to give even a short course of lectures, and students could be furnished in successive years with a course that had some variation by means of reprints provided as a preliminary course, and then amplify the subject later.

ST. MORITZ, ENGADINE.

BY ARNOLD C. KLEBS, M.D.
CHICAGO AND ST. MORITZ.

THE opening of the high mountain regions for the one in search of recreation and health, the recognition of their life-giving and healing powers, have come to mankind only in modern times. Greater facilities of travel brought also greater desire to enter the mystery and solitude of the mountains. In ancient times, people stood in awe of the unapproachable, forbidding and cold mountains; in the Middle Ages superstition kept them away, although in isolated cases we find enthusiastic reports from mountain travellers. The discovery of the Alps, with their lofty snow-peaks and their fertile green valleys, came to Nature-loving humanity only with the advent of the Italian Renaissance. The great mountain barrier had to be crossed and recrossed, not only by soldiers, but by many others in peaceful pursuits. That mountain valley of the Inn, the Engadine, became very early one of the high roads for the traffic between Italy and Austria, many travelling from the plains of Lombardy along Lake Como and up through the Val Bregaglia to the countries of the Danube. Reports of the beauty of this valley, of its healing springs, soon spread and, especially the latter, brought many visitors, pilgrims and health-seekers in the fifteenth century. Leonardo da Vinci, the great genius of those times, must have seen and admired the valley in his visits to the Monte della Disgrazia and the Bernina. But for the health-seekers the acid springs

of St. Mauritius proved the greatest attraction. Theoprastus Bombastus Paracelsus, that queer genius, early in the sixteenth century visited and described them; soon after him the celebrated physician and naturalist at Zurich, Conrad Gessner, praised their great healing power. And so St. Moritz became a flourishing health resort in the seventeenth century without any rival in those altitudes, and maintained and increased its reputation through all the following centuries to our times.

In our exact age its springs and all its climatic factors in summer and in winter have been carefully analysed. A library has been written setting forth its many advantages to the health-seeker and the tourist, so much so that any additional information may seem out of place. To the American physician, however, it may be of interest to know in what essentials St. Moritz differs from the many high mountain resorts of our Rockies, where we have beautiful scenery combined with health-giving climate and mineral springs. Foreign travel will be indulged in, no matter how large and how beautiful our own country may be, and it ought not to be discouraged, for we will be the gainers from it in the end. And especially can we learn much from a visit and close study of European spas, where long experience and familiarity with the subject has established a most thorough therapeutic utilisation of the natural advantages. Among all the European spas St. Moritz holds a unique position, by virtue of its high alpine climate (6,000 feet), modified by the sheltered position on the southern slope of a high mountain range and its chalybeate and carbonic acid springs. It would almost seem as if bountiful nature had here supplied all those agencies which we know so well antagonise the ill-effects of an overworked modern existence.

St. Moritz, although easily reached, from Paris for instance, by the Engadine express, leaving in the evening and arriving in the early afternoon, does not attract the rushing visitor,

who in a short space of time wants to visit as many places as possible on the through route. As the terminal station of that masterwork of engineering, the Rhaetian Railway, it is the destination of those who wish to come to the Engadine for a longer sojourn, a fact which gives to its visiting population a character of greater permanancy than that usually found in spas of equal importance. It also is not and will not be, as long as the present policy is pursued, a large sanatorium for the advanced, hopeless invalid. The absence of an atmosphere of invalidism, so painfully perceptible in other health resorts, adds very much to the charm of St. Moritz and increases its value to those afflicted with less serious and less apparent, though none the less troublesome, complaints. On the other hand, it is true that St. Moritz attracts both in summer and winter large crowds of visitors ; that the cost of living is as high there as anywhere in Europe, but that it has ample accommodation in excellent hotels ; and for the one who has to economise, very good, though simple, accommodation may be found in the immediate neighbourhood at Pontresina, the Maloya, Campfer, Silvaplana, Sils, Celerina, Samaden, and other places.

If I were asked to which of the many climatic and other hygienic factors of St. Moritz and the Engadine I attributed the most important *rôle*, I should be at a loss to give a satisfactory answer. The abundance of natural stimuli offered to us here is so great that individual requirements can easily be met by adequate variations of one's mode of life. What we see and feel is of all these stimulating impressions the most evident. An exquisite landscape unrolls itself before our eyes, a green carpet of meadows is spread over the whole bottom of the valley, fringed by a dark green border of pine forests reaching high up the mountains to where rock, and higher up, snow and ice, begin. And over all this an azure sky which reflects itself in the many clear lakes and tinges the bubbling

Inn as it rushes through the green meadows, a colour scheme and lines to delight the worst hypochondriac. And it changes every hour, almost every day, offering new charms. The quality of the air, as in all high mountain resorts, is here considered something special, something so very different from that in any other spot of the earth, that it brings back yearly a great number of old *habitués*, men and women much travelled, but never tired of singing the high song of praise of the Engadine air. The Grand Duke of Baden and his charming consort are of these, having made their yearly visit for nearly thirty years.

I am myself prejudiced in favour of that air, although I confess that I am unable to explain its peculiarities. Dr. Veraguth and others, and quite recently Dr. Nolda, have published exact analyses showing its great dryness, its coolness in summer, its warmth in winter, through the absence of wind and the strong insolation, its freedom from micro-organisms and dust, all factors which, together with the rarity of the atmosphere, the diminished pressure, perhaps also with the greater ionisation and radio-activity, have such effects on our bodies as we express by the terms, bracing, stimulating, vivifying. The physiologic effect of each one of these factors, or groups of them together, is still, and probably always will remain, a field for scientific speculation, but the benefit derived from all those external influences, more powerful, more immediate in action here than elsewhere, cannot be denied. That the visible or invisible radiations of the sun in the clear atmosphere of the Engadine have a direct and very powerful healing influence on wounds, on surgical tuberculosis, &c., has been very objectively demonstrated by Dr. Bernhard in his solarium hospital at Samaden, where he has for years most successfully treated all such cases by continuous insolation and orthopædic and surgical measures, a method which has

been imitated with equal success in other hospitals in high Alpine resorts. Heliotherapeutic experiments have in recent years firmly established the healing power of certain rays, especially those of the violet and ultra-violet end of the spectrum, and it is not unreasonable to expect a greater efficiency of these rays in the high, clear atmosphere, where they are not so much absorbed as in the moisture-laden air of the lower levels.

More exactly are we able to determine the beneficial factors in the springs of St. Moritz. There are three of them. The "Old Spring" is used principally for bathing, the "Funtauna Surpunt" for bathing and drinking, while the "Paracelsus Spring" is employed internally only. All these are powerful carbonic acid and iron springs, and it is needless to dwell on their exact composition and therapeutic value, the world-wide reputation of St. Moritz being principally due to them. The carbonic acid baths are administered in a spacious establishment, also well provided with modern hydrotherapeutic appliances. With these facilities we are able to carry out the regular Nauheim *régime* with great success in properly selected cases. Degenerative processes of the cardiac muscles and uncompensated valvular disease are, of course, counter-indications. But for the systematic treatment of certain circulatory disturbances, functional or organic, St. Moritz offers facilities which cannot be over-estimated, and which, to my mind, have never been sufficiently insisted upon.

Oertel, in 1886, called attention to the benefits derived in such cases by a utilisation of the varying conformation of the ground (terrain) for systematic and individually graduated exercise. "The constant overcoming of obstacles, which oppose themselves to movement, to walking, becomes," he said, "gymnastics, becomes a powerful, invisible, active force, which not only produces healthy bodies, but can also be

utilised for reconstruction where the body has suffered injury." He held that the heart, like any other organ, being under the influence of the nervous system, is capable of psychic, physiologic and mechanic stimulation, and that for this muscle, as for any other muscle, the same laws apply for its nutrition and strengthening: sufficient supply of appropriate foodstuffs, increase of function through strong contractions, *i.e.*, gymnastics. Those disturbances of the hydrostatic equilibrium, with congestive sequelæ, brought about by a lesion of the pumping apparatus itself, its valves, by a reduction of its power, or by a diminished volume of a part of the vascular apparatus through organic lesions, particularly in the pulmonary circulation, can be directly influenced by systematic gymnastics of the heart, which attempts to produce voluntarily, and for a prolonged time, strong and frequent contractions. Upon this principle the whole Schott *régime* is built, though much more artificially than that of Oertel, which utilises natural conditions to the same end and with the same effects. Here we find the remedy is the ascending of hills and mountains, with all the diverting variety of scenery, with the open mountain air as invaluable adjuncts, there the monotony of artificial gymnastics and carbonic acid baths. The prime requisite for a proper locality for the "terrain cure" is by no means only a ground with a varying profile, it must have smooth, well-kept paths, not only of different degrees of steepness, but also protected from winds and too hot a sun, and by offering a variety of scenery, adding interest and pleasure to the *régime* and keeping from it the odium of monotony. In the many terrain resorts where Oertel's *régime* has been successfully practised for years, all the paths are marked at certain intervals, benches and shacks are erected at varying distances, and thus the physician can adapt the daily exercise to the individual case as accurately as doses of medicine. St. Moritz

is not yet a terrain resort in the exact sense of Oertel, because very few of its paths are marked off at certain distances, but this, no doubt, will soon come, because the conformation of the ground and an abundance of excellently-kept paths of every degree of inclination seem to fit it to a very remarkable extent for this particular form of therapeutic utilisation. There are paths well shaded and protected from the sun for miles on a dead level, then others with a gentle incline, others somewhat steeper, and lastly, such as require a considerable force in climbing, all of them offering varying and pleasing outlooks into the valley and on the mountains. One is thus enabled to change a patient's route daily, making his gymnastic *régime* not only beneficial but interesting.

The marking of distances covered by an average individual in a given time period (quarter to half an hour), as a uniform measure of the effort made, is quite necessary. I was convinced of this after I had tried to direct patients to walk by their watches. I could not have any guarantee that the desired muscular effort had been made, it being entirely dependent on how the patient happened to take to the exercise, one day covering a long the other a short distance in the same time. I therefore noted on my maps certain landmarks at given intervals which I determined in walking over practically all the paths, and utilised them in the same way as done in other terrain resorts. From that time onwards I was able to regulate the exercise of my patients quite accurately and very much to their advantage. However, it will be of still greater benefit to have conspicuous markings on all the paths. The very active "Kurverein" of St. Moritz seems to be willing to undertake this work, which will very materially increase the value of the conformation of the "terrain" for therapeutic gymnastics.

Oertel insisted that the altitude of a given place was of little importance in determining its suitability for a terrain resort; that the possibility for ascent and descent of hills

and mountains was the qualifying factor. It is, however, evident that in a higher altitude a greater muscular effort will be required for a prescribed climb than on a lower level, and one has to bear this in mind in giving directions to a patient in a place like St. Moritz. It is also very necessary to take into account the necessity of rest in the period of acclimatisation, which, in individually varying degrees, manifests itself in many patients arriving in the Engadine from the lowlands. A short stop at an intermediate point of lesser elevation, and, before all, absolute rest out of doors, for everyone on arrival, are most advisable and preventive of disagreeable disturbances. The effect of the altitude and the *régime* on patients is individually very different, and I hold and practise that it is wise to send patients somewhere else if there is no immediate improvement or even increased disturbance. One cannot be careful enough in this respect, and especially in those cases of slowly developing dormant myocarditis, which are sent with the diagnosis of cardiac neuroses.

After the period of acclimatisation, which with proper precautions need in no case be longer than a few days, the patient can begin his *régime*. General rules as to the quantity of water to be drunk, the number of baths to be taken, and the amount of exercise, can, of course, not be given, all depending on the individual reaction of the patient to the climate. But in regard to climbing, every patient needs certain directions which will very materially enhance the value of this exercise. The principal point is that they must learn to step and to breathe properly, and that the two functions become correlated. By this climbing not only becomes easier but it also can be longer continued. I follow Oertel in his directions, finding them by experience the most suitable. The experienced mountaineer takes for each respiratory movement three or even four steps ; this, in such patients as we have to deal with, would invariably cause dyspnœa, with

harmful results. One must therefore insist on a definite, suitable rhythm, and this is to be found in advising that for each step there must be either one inspiration or expiration. It needs practice for the patient before he becomes used to this rhythm, but if he gives himself conscientiously to it, it soon becomes automatic, and he will continue it without any conscious effort. Interrupted, or better, divided expiration will be found useful in difficult breathing, and especially on the steeper paths, and patients usually take instinctively to it, though most need instruction in this direction. The principal point is that the patient must learn to measure his steps by the length of his inspiration and expiration. The important physiologic purpose of these systematic exercises is strong and frequent contraction of the cardiac muscle. This manifests itself to the patient as palpitations. He must climb in the prescribed manner until these become perceptible, then he must stand still until their perception becomes less and less, and finally disappears, whereupon he continues his exercise. It is, of course, evident that such systematic exercise influences not only the cardiac muscle, but also the whole circulatory apparatus; it brings about an acceleration of the venous flow towards the right ventricle, and an increased blood supply of the lungs and the arterial system of the body. This is the most powerful remedy against the congestive conditions resulting from the disturbance of the hydrostatic equilibrium, the uneven distribution of the total mass of blood, where the inflow of blood is not in proper relation to the outflow. The stagnation of blood in the venous system is overcome and the cardiac muscle, which through addition of fat or degenerative processes of its fibres has lost, and will more and more lose, in power, gradually regains its normal function. It is also evident that increased perspiration, frequent and deep respiration, will reduce the total of the body fluids, a most important factor, which has also to be taken into consideration in the dietetic management of each case.

As to the therapeutic indications of St. Moritz, its waters and baths, and its "terrain cure," the same rules apply as to other resorts of similiar high elevation. Only patients in good general condition with sufficient constitutional resources ought to be sent there. Advanced lesions of any kind with considerable constitutional involvement cannot find help, and ought to be treated at home or sent elsewhere ; but patients with chronic lesions of the circulatory apparatus, sequelæ of inflammatory processes of the heart, trophic cardiac disturbances and alterations in the composition of the blood, also patients with general disturbances of the metabolism, especially obesity or nervous or neurasthenic complaints, will find a stay in St. Moritz, with an appropriate *régime*, of lasting benefit to them.

Through Dr. Holland's untiring efforts, St. Moritz has of late years become the most important Alpine winter resort. The dry winter atmosphere, the complete freedom from winds and dust, when the ground is covered with deep snow, the abundant and continuous sunshine, make the intense cold imperceptible to the outdoor dweller, and a free and easy population, enjoying every imaginable sort of sports, lend unique colour to the picture of a winter at St. Moritz. The opening of St. Moritz as a winter resort has done much towards promoting high Alpine stations for therapeutic utilisation in winter, and has partly removed the illusion that warmth is so easily to be found in Southern Europe and Northern Africa. People have found out that one has to shiver more frequently in the various places of Italy, the Riviera and Egypt, than in the clear, bracing atmosphere of the high Alps in winter, where one is prepared to provide warmth during the cold nights, and where the warm sunshine and the fascinating winter landscape invite outdoor life and sport. There is no doubt that as time goes on all the other advantages of St. Moritz, its springs and its walks, will also be utilised in winter ; for the present it finds its useful agent principally in the

chemical and physical qualities of the mountain air. That this is a combination of therapeutic factors not to be despised is testified to by many high authorities, not least among whom we find Erb.

But no matter in what season a traveller visits St. Moritz, he will take home with him renewed vigour and energy, provided he only makes intelligent use of the many advantages offered. The average American traveller "does" Europe in a hurry, he goes to all the points he has time to reach, or has heard others speak of. If he has to stay longer in one place, he hangs around the hotels if there is no sight-seeing to be done. He exhibits a boredom which is sometimes pitiful to watch. Many American business men, exhausted by strenuous activity at home, many women, tired from the continuous strain of social obligations, can find their elasticity, their joy of life again, if they only know how, and they can bring home to us new ideas, which in time will work for improvement and for hygienic utilisation of the many resources of our own country.

St. Moritz, as Europe in general, is open naturally only to the well-to-do, and thus has limited interest for us. Drawing large crowds of visitors during the season, it has the drawbacks of all much frequented resorts. But I do not know any resort where one can get away from crowds as easily as in St. Moritz, the variety and easy accessibility of the points of interest and destination being very great. Even the absolute solitude of the gigantic mountain masses, with their pure white snow and greenish glaciers, is easy of reach and invites the mountaineer.

Cradle of most superb memories, source of new courage, of new force, spring of eternal youth and protectors of those who confide in them, thus they stand there, those great towering mountains, and returning to the plains one exclaims with the Psalmist: "I will lift up mine eyes unto the mountains, from whence cometh my help."

THE IRISH RIVIERA.

BY CHARLES E. NAMMACK, M.D.
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We are often consulted by the overworked business or professional man or woman, or by the convalescent from acute illness, who is not yet quite fit to take up active work again, as to the advantages of an ocean trip combined with a short stay in new and interesting surroundings. To those who cannot find time for the long Mediterranean voyage, with its accompanying artistic and archæological attractions, a trip of four weeks to Ireland, and around its southern and western coasts, lakes and mountains, can be confidently recommended. One needs to be dead to appreciation of natural beauties who cannot find in this region both charm and rest to his physical senses; and to one who has enough Irish blood in him to enter into the poetry, patriotism, cheerfulness and humour of the Irish people, the trip is sure to be almost an unmixed joy. The slight reservation is made because two things may mar the traveller's happiness—hotels which leave something to be desired; and rain. The latter, though liberal as to quantity, is yet as soft and gentle as the Irish smile, and soon gives way to sunshine, like the country itself, which has been smiling through her tears during seven centuries.

Even for those who wish to make a winter stay of three or four months, there are parts of Ireland where the winters are mild, genial, and even delightful, and where the climate is not subject to the rapid variations in temperature which

mark the climates of more southern countries. This is especially true of the southern coast-line of Cork and the south-west coast of Kerry. Here the westerly and south-westerly winds are warmed by their passage over the Gulf Stream, and have a moderating influence on the Irish climate, although it cannot be denied that they add to its humidity. The south-west coast of Kerry probably enjoys a more equable temperature than any other part of the British Islands, the average daily variability of temperature at Valentia Island being only $1\frac{9}{10}°$ F., while that of the south of England is $2\frac{7}{10}°$ F. The mean winter temperature at southern points in Ireland is as follows: Queenstown, 44·21°; Glengarriff, 45·0°; Valentia, 44·9°; Blarney, 44·5°. The mean annual temperature at these places, and at others practically within the same isothermal range, varies between 50° and 52°.

The rainfall, which is the principal objection urged against this beautiful country, is less at Queenstown than at Ventnor or Torquay, both of which are much in demand as English winter health resorts. Glengarriff, situated in a sheltered nook in Bantry Bay, on the south-west coast, has an exceptionally mild climate in the late winter and early spring months, and there is an unusually large amount of daily sunshine at these seasons of the year. The mean annual sunshine at this point is given by W. F. R. Phillips as 1,600 hours. There is every accommodation here for a short or a long stay, including full facilities for boating or fishing, and much to interest the geologist or botanist. The vegetation furnishes most convincing proof of the mildness of the climate. Tender fruit trees, which during January, February and March in other places are carefully nursed under glass, here thrive without any such protection, and the most delicate flowering shrubs are met with wherever one walks. Sufferers from bronchial or tuberculous affections derive great benefit and relief from a sojourn here, as Glengarriff is protected from the colds winds

of the north and east by a lofty range of mountains, the balmy winds which come from southerly points prevailing. It is reached by rail from Queenstown, where the Transatlantic steamers stop, in half a day, the last ten miles of the journey being made in well-appointed conveyances which run over fine roads through a most picturesque country from the railway terminus at Bantry. Another railway terminus at Macroom, thirty-six miles from Glengarriff, affords a coach drive through some of the most wildly beautiful country in the world, but is more fatiguing to invalids. Glengarriff (the rough glen) so completely combines all the beauties of a sheltered sylvan nook and a charming island-dotted sea lough, dominated by finely shaped and stern mountains, that it is quite impossible to do justice to its scenery. The usual hotel reproach, common to Irish hostelries, is scarcely merited here, although the American traveller who looks for onyx staircases and express elevators will have to content himself with the geraniums, fuchsias and myrtles, which flourish in the open air all the year round, and the incomparable view from the window of his plainly furnished bedroom. It is a veritable Madeira—in Ireland. The potato planted early in February is ready for use in May. The luxuriant growth of the vegetable world strikingly proves the exceptional mildness of the climate, and conveys more than the most graphic description of this health-restoring and charming district. Thermometrical observations are open in many ways to error, and may deceive the most careful observer, but it is not so with the vegetable world — it cannot so easily deceive. Plants reveal much more than mere temperature, for they derive their very existence and luxuriance by moisture or dryness, by wind or by calm, and by the character of the soil from which they take their growth.

The number of cases of consumption developing at Glengarriff and the district surrounding it was shown by the

Registrar-General for Ireland to be only 11·8 per 10,000 of the mean population. It has been the unanimous experience of English and Irish physicians for many years that Glengarriff has no equal anywhere as a winter and spring residence for pulmonary patients. It has three hotels, all exceedingly well managed and very comfortable. Of these, the sheltered position of the Eccles Hotel makes it the most desirable to the bronchial sufferer at this season of the year. Of its scenic attractions Thackeray has said, "What sends picturesque tourists to the Rhine and Saxon Switzerland when at Glengarriff there is a country the magnificance of which no pen can give an idea? Were such a bay lying on English shores it would be a world's wonder." Of Glengarriff in the summer so much is to be said in praise of the tangled pathways, the secret dells, the twilight groves of beauty, in this rough glen, that one would be suspected of Irish enthusiasm who would give free rein to his Pegasus. Its situation alone, on one of the far-famed and beautiful fjords of South-west Ireland, bewitches the senses. The keen and searching easterly winds which sweep the coast of the Italian Riviera and the southern coast of England are happily wanting at Glengarriff. Extremes of heat and cold are unknown, the mean annual range being about 15°.

Glengarriff Harbour is surrounded by ranges of mountains which shut out all winds except those from the south, and even from this wind Garinish Island shelters the shore near the Eccles Hotel, which is at the water's edge. The annual rainfall is about 50 inches on some 230 days, but the ground dries quickly owing to its hilly character. The bulk of the rain falls in the late summer, throughout the autumn, and in early winter, but in spring the climate is generally delightful.

Leaving Glengarriff by coach, over the far-famed Prince of Wales' Route, the sheltering range of mountains is crossed to Kenmare, which is the starting point of another delightful

coach drive round the Kerry coast to Valentia Island; or for those who decline this trip, the journey may be continued on the same day to Killarney. Six miles from Glengarriff the road crosses the watershed at 1,200 feet elevation, and passes from Cork into Kerry, descending gradually into Kenmare, a pleasant little town in a pretty neighbourhood, where a comfortable stop may be made. Those who decide upon the Kerry coast trip will find at Parknasilla another winter station similar to Glengarriff, situated in a sheltered corner on the northern shore of Kenmare Bay. The combination of mountain, wood and water gives a special advantage and charm to this locality. The early vegetation gives a reassuring proof of the equable and balmy character of the climate. Parknasilla is neither town nor village, but one of a little group of marine paradises on an inlet of the great sea lough known as Kenmare Bay. There is a good hotel with beautiful walks through its grounds, and the neighbouring gentry usually allow liberal access to their domains. Bathing, boating, and channel as well as deep-sea fishing, can be freely enjoyed. To chronic sufferers from respiratory diseases, and to convalescents, Parknasilla will prove a veritable haven of health and rest.

Continuing by coach from Parknasilla, Waterville is the next stopping place, and is another paradise for anglers. Although but a village of little more than a single street, the transportation company maintains a very comfortable hotel. From Waterville, the tour may be taken up next morning to Valentia Island, which has three principal attractions for the traveller: the lovely views from its northern end, the great cliffs at Bray Head at the south-western extremity, and the interesting apparatus of the Anglo-American Telegraph. Five cables converge here.

From Valentia Harbour to Cahirciveen is but three miles, and here the railroad is rejoined for a forty-eight mile ride to

Killarney. A hurried tourist may make this circuit of the Waterville promontory in two days, but four days are better, and a week is all too short to drink in the beauties of a superb coast, lovely lakes, and bold mountain outlines, and to prepare one for entrance into the glorious region of the Killarney Lakes.

The town of Killarney is a distinct disappointment. To use a Hibernicism, the attractions of Killarney are out of Killarney, among the lovely lakes and romantic hills which have made the name of Killarney far and wide a synonym for the most charming and captivating form that Nature has adopted. To describe it would bankrupt a poet's vocabulary. Dr. D. Edgar Flinn, a well-known writer on climatology, says that nowhere can a more delightful holiday be spent than here. Each day there are new scenes and new sights to be visited, and the eye never tires or grows weary. It is one continued glimpse of fairyland—a reign of enchantments. Its merits as a health resort have been completely overshadowed by its attractions for the pleasure tourist. It enjoys a very moderate and equable climate, being well sheltered and protected from cold winds. The rainfall is somewhat above the average, but this defect is common to all mountain resorts. Open-air exercise can be indulged in winter and spring without any chill or discomfort. The mean temperature for the year is 50° F.; for January, 43·1° F.; for July, 58·7° F. Sweet Innisfallen Island in the lower lake will be a treat for the antiquarian.

The return journey from Killarney to Queenstown, by way of Cork, can be made in a few hours. Blarney, near Cork, is the site of the famous castle eloquent, and has a favoured position on dry, sandy soil. Its temperature is remarkably equable throughout the year, the mean for winter and spring being 43·5° F., and the mean annual 51° F. It is one of the few places in Ireland maintaining a good sana-

torium, St. Anne's Hill, thoroughly equipped with all the last improvements in electro- and hydro-therapeutics, and surrounded by woods and grounds covering over 600 acres. Blarney is brimful of interest to the visitor, and but a half-hour's journey from Cork, a city of 98,000 inhabitants, on the pleasant waters of the River Lee, which lead into Cork Harbour and to Queenstown. A stay in Queenstown for a day or two with harbour excursions will be found pleasant and profitable while awaiting the Transatlantic steamer. Queenstown enjoys a magnificent situation, and its climate is remarkably mild and equable and at the same time fairly dry and tonic. It is completely protected from north and east winds, and, owing to its hilly situation, when there is any rain it quickly flows off and the roads become dry. It has the least annual rainfall and the greatest annual sunshine of any spot in Ireland. The tour here outlined, from Queenstown to Queenstown, can be easily made in the sixteen days intervening between the arrival and departure of the fast steamers of either the Cunard or White Star Line, and the traveller can be back in New York on the twenty-ninth day after leaving home, if he is so unfortunate as to be limited to one month's vacation. But one who is not so pressed for time can find many other delightful spots in Ireland, and a visit to Dublin is well worth while on its own account, besides affording a convenient centre for excursions to Bray, "The Irish Brighton," and the beautiful County Wicklow. About seven miles from Wicklow town stands the National Hospital for Consumptives for Ireland, opened in 1896. Altadore Sanatorium, among the foothills of the Wicklow Mountains, treats pulmonary diseases on the Nordrach system. Dublin has a mean annual temperature of 49·5° F.; January mean, 41·1° F.; July mean, 60·3° F. Its mean annual rainfall is 28·31 inches, distributed over 195 rainy days. Its relative humidity is 82·5 per cent. Vast improvements have been

made in recent years in the water supply and drainage systems of Dublin, and first-class hotel accommodation can now be had. In fact, during the last ten years, all Ireland has awakened to a realisation of the hygienic requirements of visitors to her shores, and when the surroundings of her natural beauties are as carefully conserved as are those of Continental resorts, the tide of travel and of fashion may be diverted. The railways of Ireland are no longer slow, uncertain and dirty, and the railway companies have established, and co-operate with, a fine line of hotels where delay, shiftlessness and dirt have been replaced by promptness, thrift and cleanliness. In the smaller places, however, old ideas still prevail, and the pleasant country English inn will be regretfully missed by those who have seen much of the governing country. Still, no matter in what direction the traveller wends his way through the Emerald Isle, he will find, apart from the scenery which bewitches by its infinite variety, an unrivalled field for archæological, legendary, historical, botanical and geological research.

REFERENCES.

FLINN, D. EDGAR. "Irish Health Resorts and Watering Places," Second Edition, 1895.

FLINN, D. EDGAR. *Journal of Balneology and Climatology*, vol. i., 1897.

LETTERS, PATRICK, and MOORE, JOHN WILLIAM. *Ibid.*, vol. ii., 1898.

WARD, C. S. "Ireland," part ii., London, 1901.

WEBER, F. P., and HINSDALE, GUY. "Climatology—Health Resorts," Cohen's "System Physiologic Therapeutics," vol. iii., 1901.

THACKERAY, WM. M. "The Irish Sketch Book of 1842."

MOORE, Sir JOHN W. "Climates and Baths of Great Britain," vol. ii. Macmillan and Co., 1902.

THE ACTION OF THE WATERS OF FIUGGI, ITALY.

BY CARLO COLOMBO, M.D.
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THE Fiuggi water has been, up to the present time, the object of too imperfect and superficial study for the mechanism of its action to be known, even partially, in the morbid cases in which its use is indicated.

We possess an excellent quantitative analysis, made in the Royal Chemical Institute in Rome, by Canizzaro and Marino Zuco in 1889. In 100,000 parts of water are contained :—

Chloride of sodium	1·208	grammes.
Nitrate of potassium	0·727	,,
Carbonate of potassium	0·093	,,
Sulphate of calcium	0·555	,,
Carbonate of calcium	1·159	,,
Chloride of magnesium	0·114	,,
Carbonate of magnesium	0·945	,,
Salicylic anhydrates	1·073	,,
	5·874	,,
Indeterminate and lost substances	0·246	,,
Total ...	6·120	,,

Fixed residuum at 180° C.

Besides these, it contains slight traces of various oxides, as oxide of copper, oxide of iron, oxide of aluminium, oxide of strontium, oxide of barium, oxide of lithium, oxide of rubidium, oxide of titanium and vanadic anhydrite.

This list shows clearly that the Fiuggi water belongs to

the category of waters of low mineralisation, which used to be considered as simply drinking waters, and called *indifferent waters* or *indeterminate waters*:[1] and that for the reason that most hydrologists held for a long time, and many hold still, that the therapeutic powers of natural waters are in direct relation to the quantity of mineral elements which they contain.

Not being able to deny the very evident therapeutic action of these waters, they tried to explain it in some cases by their temperature more or less superior to that of the human body; in other cases, where the temperature is much lower, to some of the elements in solution in the waters or to other causes not determined by the analysis, to radio-activity, &c.

On the contrary, the mechanism of the action of such waters of low mineralisation, and called, for that reason, *oligo-metallic*,[2] consists wholly and solely in that same purity, and rests on the physico-chemical law of *osmosis*, by virtue of which *two liquids of different densities, separated by an organic membrane, mix together to establish the equilibrium of equal density*."

These waters, absorbed in large quantities, pass easily, by reason of their lightness, into the circulatory system, penetrate into the tissues and cells through the cellular membrane on account of their low mineralisation, which confers on them a minor density than that of the organic liquids, and from the tissues and from the cells draw with them, besides the physiological elements, the waste from nutrition.

Thus "the oligo-metallic waters, gifted with high *osmosant* virtues, owe their activity, *not to what they contribute to the organism, but to what they draw away from it*," according to the happy phrase of Huchard. They have a high dissolving power, and perform in a certain way *the irrigation of the tissues and the cleansing of the blood.*

These considerations of hydrological synthesis, which,

although only formed most recently into doctrines, did not escape the good sense of former times, should have sufficed to establish the remarkable therapeutic properties of Fiuggi water in uric diathesis.

In 1867 Scalzi[3] had asserted, basing the assertion on a purely qualitative analysis made by the chemists Ratti and Viale, that the curative virtue of the Fiuggi water "depends on the ease with which it passes right into the urinary canals, thanks to its specific lightness and to its moderate acidity; and which concentrates in the mechanical action of drawing along with itself, when drunk in abundance, the solid matters of the blood, as well as in the faculty of easily incorporating with itself, by its poverty in fixed substances, the solid elements of the blood, the same effect as is produced by distilled water."

But this explanation, as simple as it is scientifically exact, did not please the pseudo-hydrologists who were interested at that time in the Fiuggi water, and therefore they had a new and more accurate analysis made which was to reveal the unknown principle to which the action of the Fiuggi water was due.

So the Canizzaro-Marino-Zuco analysis was made, which only confirmed, in a manner that left nothing further to be said, the results of the Ratti-Viale analysis, that is to say, that the Fiuggi was a water of low mineralisation, without special fixed elements of specific weight, scarcely superior to that of distilled water.

But neither was this analysis considered satisfactory, and so, as there was nothing to hope from the fixed substances, recourse was had to the gases, and Bacchini[4] found oxygen, and Cerasoli[5] ozone. Zinno,[6] also charged with a quantitative analysis of the æriform elements, was able to determine the existence in a litre of water of

Oxygen	...	...	...	17·36 cc.
CO_2	...	...	...	15·87 ,,
Azote	...	...	...	9·33 ,,

The evident excess of oxygen over azote, which shows the existence of a certain quantity of free oxygen in the Fiuggi water besides that from the air, only corresponds with the great purity of this water, which not only allows of mixing it in large quantities with other more highly mineralised waters, but also of keeping it unaltered for a longer time, there being in it less matter to oxidise. At the same time, the importance of this oxygen has been much exaggerated; for it is contained in the Fiuggi water to the amount of scarcely 17 cc. per litre, a very microscopical figure; but even if the quantity were much greater, it is not to this that we must attribute the efficacy of the Fiuggi water, which is evidently of quite a different nature, since we draw into the blood with every act of inspiration an immensely greater quantity of oxygen.

We have already alluded to the physico-chemical law of *osmosis*. The physical conditions under which this comes into action are found precisely in the human organism when we administer a quantity of mineral water as beverage.

Rather than the now classical distinctions of solutions into *hypotonic*, *isotonic*, and *hypertonic*, according to the organic lymphs described, and especially according to the blood serum, it is necessary here to take into account two very different cases: one in which the water is highly mineral, and therefore *denser than the normal solution* of the indeterminate liquid of the human organism; and the other in which the water is of very low mineralisation, and therefore *less dense* than such a normal solution.

This last case is, indeed, very rare, and the Fiuggi is perhaps the sole example of it among the natural waters of Europe.

Let us see in what the so-called *normal density of the indeterminate liquid of the human body* consists, as it results from SCHMITH'S table :—

The body of a man weighing 65·000 *kg. contains* 49·500 *kg.*

of water; 5,194 *of mineral substances;* 10,306 *of organic substances.*

Thus every litre of water in the human body contains 104 *mgs. of mineral substances, and about* 208 *mgs.—double the amount—of organic substances.*

This is how the solid elements, organic and inorganic, of a human body weighing 65 kg., are distributed, according to the analysis of SCHMITH :—

	Grammes	Grammes
Albumins	7·500 or	0·152 per litre.
Phosphate of calcium	3·940 ,,	0·080 ,,
Fats	2·060 ,,	0·042 ,,
Bone gelatine	2·055 ,,	0·042 ,,
Keratin	1·877 ,,	0·038 ,,
Chondrin	0·703 ,,	0·014 ,,
Carbonate of calcium	0·475 ,,	0·009 ,,
Hæmoglobin	0·703 ,,	0·014 ,,
Fluorid of calcium	0·230 ,,	0·005 ,,
Neurin, Lecithin, Cerebrin	0·405 ,,	0·008 ,,
Phosphate of magnesium	0·218 ,,	0·004 ,,
Chlorid of sodium	0·218 ,,	0·004 ,,
Cholesterine, Inosite, Glycogene	0·933 ,,	0·018 ,,
Silicate of sodium	0·069	
Silicate of potassium	0·050	,, 0·002 ,,
Silica	0·002	

The normal density of the mineralisation of the human body, which is what we are concerned with in this study, is, therefore :—

Carbonate of calcium	0·009	grammes per litre.
Chlorid of sodium	0·004	,, ,,
Silica and alkaline silicates	0·002	,, ,,
Phosphate of magnesium	0·004	,, ,,
,, calcium	0·080	,, ,,
calcium	0·005	,, ,,
Total ...	0·104	,, ,,

We have to do then with a mineralisation so low *as not to be surpassed by any water* examined up to the present day from this point of view. In fact, the water of *Penticosa*, in Spain, which is considered the type of *oligo metallic* waters, as being the least mineralised in Europe, is composed as follows :—

Carbonate of calcium	0·005	grammes	per litre.
,, of sodium	0·025	,,	,,
Alkaline silicates	0·019	,,	,,
,, of magnesium	0·005	,,	,,
Sulphate of sodium	0·074	,,	,,
Total ...	0·128	,,	,,

and thus contains mmgr. 24 per litre of mineral substances above *the average solution* of the liquid of the human organism.

The other waters considered as oligo-metallic have all a much greater density of mineralisation, not excluding the famous Evian water, which is considered one of the lightest waters of France, and is esteemed there for the same physical qualities and the same therapeutic virtues as our Fiuggi.

We append a comparative table of the density of mineralisation (fixed residuum at 180° C.) of the principal oligo-metallic waters of Europe :—

Water of Fiuggi	0·061	grammes	per litre.
,, Mangiatorella	0·070	,,	,,
,, Penticosa	0·128	,,	,,
,, Ragatz-Pfeffer	0·287	,,	,,
,, Gastein	0·333	,,	,,
,, Schlangenbad	0·316	,,	,,
,, Plombières	0·370	,,	,,
,, Sail-les-bains	0·453	,,	,,
,, Italia	0·479	,,	,,
,, Chaudefontaine	0·488	,,	,,
,, Evian	0,500	,,	,,
,, Saint-Laurent	0·682	,,	,,
,, Monticchio	0·699	,,	,,
,, Santa di Roma	0·742	,,	,,
,, Cinciano	0·769	,,	,,

Water of	Pellegrino	1·133	grammes per litre.
,,	Sanguinni	1·641	,, ,,
,,	Vittel (chief spring)	1·650	,, ,,
,,	Ferrarelle	1,691	,, ,,
,,	Contrexeville	2·400	,, ,,
,,	Uliveto	2·595	,, ,,
,,	Vittel (Salée Spring)	2·750	,, ,,

This list, while it easily demonstrates the superiority of the Fiuggi water over similar waters in Europe, shows us how little our most precious things are known out of Italy, and indeed among ourselves.

The Fiuggi water, as a matter of fact, leaves far behind it, for purity and scarcity of mineral matter, all the above-named waters, even the famous Penticosa. But there is something more, for it presents the exceptional phenomenon of being even *less dense than the normal solution* of the liquids of the human organism, a thing which till now was never found in any European water, and was not thought possible by the hydrologists.[7]

This is shown by the following summary, which gives for the Fiuggi water :—

Carbonate of calcium	0·011	grammes per litre.
Chloride of sodium	0·012	,, ,,
Silica and alkaline silicates	0·011	,, ,,
Chloride of magnesium	0·001	,, ,,
Carbonate of magnesium	0·009	,, ,,
Sulphate of calcium	0·005	,, ,,
Nitrate of potassium	0·008	,, ,,
Indeterminate substances	0·004	,, ,,
Total ...	0·061	,, ,,

We have, therefore, the following comparative densities of mineralisation :—

Liquids of the human body	0·104	grammes per litre.
Penticosa water	0·128	,, ,,
Fiuggi water	0·061	,, ,,

which permits us to assert that, although the Penticosa water has been considered up to the present time as the least

mineralised in Europe, and as *the type of oligo-metallic waters*, this honour now belongs to the Fiuggi water, which possesses a mineralisation less by one half than the Penticosa.

Taking up again our study of the solvent properties of the oligo-metallic waters, of which the Fiuggi is the type, we must again recall the law of *osmosis*, and remember that *two liquids of different densities, separated by an organic membrane, mix together to establish the equilibrium of equal density.*

An active movement takes place among the dissociated molecules or *ions*, which pass from the more dense liquid into the less dense; or rather, from both liquids the dissociated molecules of each single substance dissolved in them pass into the one which contains, in solution, a smaller quantity. Thus each of the two liquids has a double movement; that of *esosmosis*, or exit of part of the substances which are dissolved therein in excess, and that of *endosmosis*, or inrush of part of the substances, which are, on the contrary, dissolved in excess in the other liquid.

The equilibrium of density, or *isotonic state*, is therefore produced for each single dissolved substance, not in block, as was first believed, from superficial observation. In this respect, all natural mineral waters may be divided into three categories :—

(*a*) *Highly* mineralised waters, the total density of which is much superior to the *normal density* of the organic liquids.

(*b*) Waters of *moderate* or low mineralisation, the total density of which may be little superior, or even inferior, to the aforesaid *average density*, but which contain some physiological mineral element in larger proportion than that contained normally, or in a given morbid condition, in the human organism.

(*c*) Waters of *extremely low* mineralisation, the total density of which is little superior, or equal, or inferior to the *average density* of the organic liquids, and the component

parts of which are, each for each, dissolved in it, in smaller proportions than the corresponding mineral elements contained normally, or in special morbid states, in the human organism.

It is clear, from what we have shown, that the mineral waters belonging to the two first categories possess a medicinal virtue of such a nature that when they come into contact with the organic liquids they deposit in these, by *esosmosis*, the excess of mineral substances specific to them until an equilibrium is reached; and this more or less easily, more or less rapidly, according to the greater or smaller proportion of *dissociated molecules or ions* contained in them compared with the *integral molecules*.

The waters of the third category, on the contrary, the *true oligo metallic* waters, act in an opposite way, that is, by *endosmosis*. These contain no mineral element in excess over the corresponding elements of the organic lymph, therefore no esosmotic current can be set up in them when they pass into the inward web of the human body. Instead of this an inverse current is produced, for it will be the excess of the substances held in solution in the lymph of the human body, whether they be organic or mineral substances, which will go to increase the density of the oligo-metallic waters absorbed, in order to establish the equilibrium. Thus such waters become charged with the mineral or organic elements, normal or pathological, existing in the organism, and eliminate them from that organism, carrying them off dissolved in their own mass by the natural emunctories. To this category belongs *distilled water*.

The natural oligo-metallic waters are, so far, efficacious for the object for which they are indicated, as they approach most nearly to the purity of distilled water; on this condition, however, *that they contain in solution the fundamental inorganic elements of the human body, in a proportion not inferior to that of the normal living organism.*

Only in this way can the liquid consumed become the vehicle of elimination for all the substances abnormally present, or contained in excess in the organic liquids, while it will leave intact, or even augment, the fundamental inorganic elements of the tissues and of the plasma.

It will be easily understood that the greater the proportion of substances which the liquid consumed will draw from the living organism, the less must be its total density and the greater its purity.

It is exactly on account of this exceptional purity, of its smaller total density—*although containing the fundamental mineral elements in physiological proportions*—that the Fiuggi water represents, in a higher degree than any other natural water at present known, the type of antilithic mineral water.

Next: the *rapidity* with which the osmotic phenomena take place in the interior of the tissues and cells, a rapidity of action which constitutes a great part of the efficacy of the natural medicinal waters. The rapidity with which the interchange between liquid and liquid takes place in the living organism accords with the *law of osmotic pressure* in aqueous solutions, a law discovered and demonstrated by MARIOTTE, PFEFFER, GAY-LUSSAC, DONDERS, HAMBURGER, DE VRIES, and above all, by VAN'T HOFF.

This learned Dutchman has demonstrated that the principle of AVOGADRO and AMPÈRE is applicable to aqueous solutions, viz., *at equal temperature and at equal osmotic pressure, equal volumes of different solutions contain the same number of molecules; and this number is equal to that which would be contained in the same volume of a gas at the same temperature and at a tension equivalent to the osmotic pressure.*"[8]

From this law of Avogadro and Ampère, van't Hoff,[9] deduces this other general formula: "*The solution of a body in a solvent is exactly comparable to the vaporisation of the same body in a vacuum of equal volume to that of the solvent, provided*

that the osmotic pressure and the density of vapour of the bodies which occupy the same volume are identical." Which means, in other terms, that the mineral substances dissolved in liquids behave in the same way as in a gaseous state, and their molecules, those *dissociated*, be it clearly understood, move therefore with the same freedom and the same velocity as if the solvent did not exist.

And Hess's law adds that *this freedom and rapidity of the osmotic movements of the molecules is so much the more perfect as the solution is more diluted*; while Arrhenius completes it by affirming that *the dilution of a solution should produce on the rotatory power of the molecules the same effect as is produced by an elevation of temperature.*

So, then, the more rapidly the organic and inorganic elements contained in excess in the cells and in the lymphs of the organism (organic solution) pass into another liquid introduced from outside (natural waters), so much the greater will be the dilution which will result by the mixture of the two liquids.

And it is evident that the dilution of the mixture will be greater in proportion to the scarcity of mineralisation in the liquid introduced (mineral water).

In conclusion, the Fiuggi water is then the one which is in a position to dissolve and subtract from the liquids and tissues of the organism *the largest quantity* of the organic and inorganic materials contained in them, and *with greater* rapidity than any other natural water at present known.

All that we have said, up to this, explains exhaustively, on the basis of incontestable physico-chemical laws, the mechanism by which the Fiuggi water dissolves and draws away with it so many and so different organic and mineral matters, scorie and detritus, salts and radical acids, and this as much *in vitro* as in the living organ.

The Fiuggi water, then, is efficacious for what it *takes away*

from the organism, not for what it *contributes* to it ; for the cleansing of the blood which it causes.

At the same time the action of the alkaline silicates and fluosilicates may not be entirely indifferent, these being accepted by some [10] as active antifermentation agents and dissolvents of uric acid. And of such silicates the Fiuggi water really contains a considerable quantity, relatively to its great purity. But in any case this would be a chemical action negligible in comparison with the predominant *osmosant action* of this water.

We must further take into consideration the *mechanical action* of the Fiuggi water, which is habitually greater than in any other water, for the simple reason that being so pure, it becomes absorbed more rapidly by the digestive mucus, and this leads to its being taken more abundantly. The blood pressure is therefore raised not a little above the normal and very rapidly, which results in a very energetic stimulus to the kidneys, rendering diuresis abundant and urgent.

The increase of pressure is, however, the cause of another mechanical effect of this water—that of carrying along with greater force the concretions of urates and other salts accumulated along the urinary canals, as sand or gravel, and of expelling them easily.

We believe it necessary, at this point, to draw the attention of our colleagues to a most important factor which results from our observations and experimental researches which will be published later.

It may happen just on account of the rapid elevation of the blood pressure, which occurs as the effect of the abundant consumption of this water, that serious circulatory troubles may arise in cases of hypertension and arterio-sclerosis, and these arise more easily in the case of individuals in whom diuresis (and with it a lowering of the pressure) does not rapidly follow on the draught, on account of the insufficient permeability of the renal filter.

For such patients, therefore, it is well to advise drinking the water very slowly, in small quantities at long intervals ; and one should never neglect to bring to the aid of the insufficient renal function the other natural emunctories, especially the skin.

The abundant diaphoresis will replace in such persons the deficient diuresis, not only with less danger to their vascular system, but also with great advantage. For the application of dry heat to the exterior of the body, in the form of sun baths, or of Roman baths, opens the pores of the skin to all the water consumed, which has become laden in the blood with refuse material (especially uric acid, a vaso-constrictor and hypertensive poison *par excellence*), an object which is attained by dilating all the great vascular peripheral system with the benefit of rapidly lowering the blood pressure.

The question has been raised whether the Fiuggi water retains its efficacy when consumed from bottles at a distance from the spring. Those who attribute the efficacy of the Fiuggi water to mysterious virtues which have no scientific foundation, deny that it can be preserved unaltered, or at least leave it doubtful. And from their point of view they would be right.

But the history of this water demonstrates that it has maintained its qualities from all time up to to-day, even when carried to great distances.

We have statistics of patients who, by our advice, have tried the Fiuggi water as a beverage, either at the spring or in bottles at home, with similar effects. At the same time we make an exception for those complementary but very important effects, due to other physical factors, such as the pure mountain air of Anticoli, the quiet life from business surroundings, exercise, &c., &c.

But the best scientific proof that the Fiuggi water loses none of its efficacy, when bottled well by all the rules of

hygiene and hydrological technique, is in the demonstration we have given that *it acts efficaciously in uric diathesis and in all its manifestations, thanks only to its scarcity of mineral elements;* and this is a quality which it cannot lose either by its passage from the spring into bottles, or by its transport, or by its preservation.

BIBLIOGRAPHY.

[1] DURAND FARDEL. "Traité des Eaux Minerales," Paris: Masson, 1892.

[2] JULES FELIX. "Contribution a la Thérapie pas les Eaux Minerales naturelles," *Gazette des Eaux*, No. 2332, anno 46, 1903.

[3] SCALZI. "Delle acque di Auticoli e del loro vautaggio contro i calcol urianarii," *Giornale medico di Roma*, anno iii., 1867.

[4] BACHINI. "L'acqua della fonte Fiuggi, principio attivo della medesima ecc." *Tipographia Sociale*, Roma, 1889, and "Lo Spallanzani," fasc. x., anno xviii., serie ii., 1889.

[5] CERASOLI. "Dell' ozono nell' acqua di Anticoli Campagna."

[6] ZINNO. "Analisi qualitativa e quantitativa dei principii aeriformi contenuti nell' acqua Fiuggi di Anticoli Campagna," Napoli, agosto, 1903.

[7] JULES FELIX. As quoted above.

[8] THOMAS. "Phenomènes de dissolution et leurs applications," Masson, éditeurs, Paris.

[9] VAN'T HOFF. "Equilibre chimique dans les systèmes gaseux ou dissous á l'état dilué," *Archives Neerlandaises*, t. xx., and *Revue Scientifique*, 1894, p. 577, tome 1).

[10] JULES FELIX. "Les Eaux silicates," *Academie de Medecine de Paris*, 1897.

TEMPERATURE AND SUNSHINE IN LAKEWOOD, NEW JERSEY, 1900-1905.

BY WILLIAM GRAY SCHAUFFLER, M.D.

LAKEWOOD, NEW JERSEY.

THE situation, climate and natural advantages of Lakewood, N.J., as a health resort have been often described by members of this Association, and it is not my purpose to weary you to-day with a repetition of the same. But I have thought that some data gathered by me and covering the last five seasons, might be of interest and possibly of use.

The Lakewood season begins October 1 and ends June 1, and my statistics cover these eight months of each year. The thermometric records are compiled from a Draper self-recording thermometer, placed on the north-east corner of my porch. The sunshine record has been of my own keeping, and I have classified the days in three groups: Sunshine all day; days partly sunny and partly cloudy; days all cloudy, which includes rain and snow.

The average height of the barometer for the past five years has been about 30 inches, the lowest was on February 17, 1902, 28·85; the highest December 1, 1905, 31·15.

The prevailing fair weather wind from October 1 to May 1 is north-west, after May 1, east. The average humidity is low, being between 9 a.m. and 5 p.m. about 45 per cent. The hygrometer, however, often stands for hours at a time at from 25-30 per cent.

The tables of statistics which are appended will perhaps be more interesting to read than to listen to, and I will give you merely the conclusions.

		1901		1902		1903		1904		1905	
		Days	Per cent.	Days	Per cent.	Days	Per cent.	Days	Per cent.	Days	Per cent.
October	Sun all day ...	24	77·4	18	58·0	15	48·4	22	70·9	23	74·2
	Sun and clouds	7	22·6	10	32·2	8	25·8	6	19·6	4	12·9
	Clouds ...	0	0	3	9·8	8	25·8	3	9·5	4	12·9
November	Sun all day ...	19	63·4	13	43·3	21	70·0	14	46·6	19	63·3
	Sun and clouds	8	26·6	12	40·0	7	22·6	15	50·0	11	36·7
	Clouds ...	3	10·0	5	16·7	2	7·4	1	3·4	0	0
December	Sun all day ...	18	58·0	16	51·6	20	64·5	10	32·2	17	54·8
	Sun and clouds	7	22·6	8	25·8	6	19·3	13	41·9	9	29·1
	Clouds ...	6	19·4	7	22·6	5	16·2	8	25·8	5	16·1

		1902		1903		1904		1905		1906	
		Days	Per cent.	Days	Per cent.	Days	Per cent.	Days	Per cent.	Days	Per cent.
January	Sun all day ...	22	70·9	13	41·9	16	51·6	19	61·3	12	38·7
	Sun and clouds	3	9·5	14	45·1	6	19·3	7	22·5	12	38·7
	Clouds ...	6	19·6	4	13·0	9	29·1	5	16·1	7	22·6
February	Sun all day ...	19	68·0	14	50·0	18	62·0	17	60·6	15	53·6
	Sun and clouds	3	10·6	8	28·6	7	24·8	5	18·0	9	32·1
	Clouds ...	6	21·4	6	21·4	4	13·2	6	21·4	4	14·3
March	Sun all day ...	20	64·5	12	38·7	14	45·1	19	61·2	10	32·2
	Sun and clouds	7	22·6	10	32·3	7	22·6	9	29·3	16	51·6
	Clouds ...	4	12·9	9	29·0	10	32·3	3	9·5	5	16·2
April	Sun all day ...	18	60·0	13	43·3	11	36·6	14	46·7	17	56·7
	Sun and clouds	8	26·0	10	33·3	15	50·0	13	43·3	11	36·7
	Clouds ...	4	14·0	7	23·4	4	13·4	3	10·0	2	6·6
May	Sun all day ...	21	67·7	22	70·9	19	61·3	19	61·3		
	Sun and clouds	9	29·0	6	19·4	10	32·2	11	35·4		
	Clouds ...	1	3·3	3	9·7	2	6·5	1	3·3		

Per cent. for Season

October 1, 1901—June 1, 1902.

Sun all day	67·0 per cent.
Sun and clouds	17·0 ,,
Clouds	16·0 ,,
Sun whole or part of day	84·0 per cent.

October 1, 1902—June 15, 1903.

Sun all day	50·5 per cent.
Sun and clouds	29·0 ,,
Clouds	20·5 ,,
Sun whole or part of day	79·5 per cent.

October 1, 1903—June 1, 1904.

Sun all day	54·0 per cent.
Sun and clouds	27·0 ,,
Clouds	18·0 ,,
Sun whole or part of day	82·0 per cent.

October 1, 1904—June 1, 1905.

Sun all day	55·0 per cent.
Sun and clouds	32·5 ,,
Clouds	12·5 ,,
Sun whole or part of day	87·5 per cent.

October 1, 1905—May 1, 1906.

Sun all day	53·3 per cent.
Sun and clouds	34·0 ,,
Clouds	12·7 ,,
Sun whole or part of day	87·3 per cent.

TEMPERATURE RECORD.

		1900	1901	1902	1903	1904	1905
		° F.	° F.	° F.	° F.	° F.	° F
OCTOBER	Highest ...	74	75	75	85	76	77
	Lowest ...	39	39	32	25	28	35
	Average ..	56·5	57	53·5	55	52	56
NOVEMBER	Highest ...	72	66	74	64	64	65
	Lowest ...	29	24	31	14	22	24
	Average...	50·5	50	52·5	39	43	44·5
DECEMBER	Highest ...	62	65	59	58	54	63
	Lowest ...	17	10	18	3	8	18
	Average...	39·5	37·5	38·5	30·5	31	40·5
		1901	1902	1903	1904	1905	1906
JANUARY	Highest ...	57	48	52	59	57	69
	Lowest ...	9	18	16	0	4	13
	Average...	33	33	34	29·5	30·5	41
FEBRUARY	Highest ..	51	60	64	46	46	63
	Lowest ...	16	17	7	1	4	8
	Average...	38·5	38·5	35·5	23·5	25	35·5
MARCH	Highest ...	59	71	75	83	72	55
	Lowest ...	13	23	28	9	13	15
	Average...	36	47	51·5	46	42·5	35
APRIL	Highest ...	85	89	91	78	81	76
	Lowest ...	38	38	30	28	30	29
	Average..	61·5	63·5	60·5	53	55·5	53·5
MAY	Highest ...	82	83	90	92	85	
	Lowest ...	43	42	40	42	41	
	Average...	62·5	62·5	65	67	63	

WINTER RESORTS OF THE SOUTH.

BY THOMAS D. COLEMAN, M.D.
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No region this side of the Eternal City is ideally adapted to all cases or suited to all tastes; if it were, it would be crowded beyond endurance, and a conflict of interest would be inevitable. This being true, an apology for the presentation of this paper to the medical profession, and especially to this Society, is unnecessary. The constantly increasing yearly influx of pleasure and health seekers into the South makes it desirable, both for them and their medical advisers, to have available reliable data concerning the localities they may choose for temporary sojourn or permanent residence. So far as I have been able to ascertain, there are meritorious articles on special localities which may be available for this purpose if one has the literature at his command and the time to search them out, but there is no single source from which this information may be obtained. For this reason, I have thought it desirable to select the more important and popular southern winter resorts, giving their meteorological data, geographical and topographical relations, their resources in points of housing, cuisine, education and recreation for both the invalid and pleasure seeker.

In this undertaking I know that I shall, of necessity, omit many really meritorious places, and doubtless overlook some questions upon which many would like to be informed concerning the places which do receive consideration; but in

the main I shall give answer to the inquiries which I have been receiving for the past sixteen years concerning these and other localities in the South.

For purposes of convenience, the places considered will be taken up in their alphabetical order, viz., Aiken, S.C.; Asheville, N.C.; Augusta, Ga.; Camden, S.C.; Columbia S.C.; El Paso, Texas; Jacksonville, Fla.; Miami, Fla.; Palm Beach, Fla.; Pinehurst, N.C.; Summerville, S.C. (not to be confounded with Summerville, Augusta, Ga., which is really Augusta, Georgia, and has the same post-office); St. Augustine, Fla., and Thomasville, Georgia.

Localities that present much the same climatic advantage, and more or less good hotel and other accommodations I shall mention in connection with these, and since all cannot, in a paper of this size, receive minute description, I group them together wherever practicable. Asheville; Pinehurst and Southern Pines, N.C.; Camden and Columbia, S.C.; Aiken, S.C., and Augusta, Ga. (pleasant villages about the latter in which comfortable board at moderate prices may be obtained, are Groovetown and Bath, Ga.); Atlanta, Ga. (one of the most progressive cities in the South, with a population of about 100,000), and Marietta, Ga., a delightful village twenty miles distant. These two places, while not so cold as Asheville, are still not so warm as Aiken and Augusta, Charleston and Savannah are seaport cities, having populations of about 60,000 each, are pleasant places for residence or sojourn, and offer many interesting points of historical interest to the traveller. Jacksonville, on the St. John's River, and St. Augustine, close by on the Atlantic, are Florida's, two most important cities, and have given to this State much of its reputation as a winter resort.

Thomasville, like Asheville, stands by itself, since no important resort is near it, as does also Palm Beach. And so the list might be extended almost indefinitely.

In this grouping there is also a feature of value in that in a number of instances at least practically the same climatic advantages may be gotten either in the village resort or in the larger city near it, since it allows the exercise of some latitude in placing appropriate cases in accordance with their needs and inclinations, *e.g.*, Camden is located about forty miles from Columbia. Camden is a village resort. Columbia a city of about 35,000.

Summerville, S.C., a village resort, is located twenty miles from Charleston, S.C.; Aiken, S.C., sixteen miles from Augusta; North Augusta, S.C., and Summerville, Augusta, Ga.—two suburbs of Augusta—both are in close proximity to Augusta, a city of 50,000.

Without regard to any other feature besides that of temperature, the localities mentioned may be classified as follows, beginning with the coldest: Asheville and Pinehurst, N.C.; Atlanta and Marietta, Ga.; Camden and Columbia, S.C.; Aiken, S.C., and Augusta, Ga.; Summerville, S.C.; Thomasville, Ga.; Jacksonville and St. Augustine, Fla., and Palm Beach and Miami, Florida; El Paso, Taxas. In point of distance Palm Beach is 500 miles south of Asheville and Pinehurst, N.C., the other places occupying intermediate latitudes. Aside from these differences of latitude, must be considered also proximity to the sea and large bodies of water, altitude, character of the soil, &c. So that while the South is generally considered and spoken of as a unit, all of the places mentioned possess peculiarities of their own, which make them more or less desirable for the individual case. Paramount, perhaps, above these are suitable accommodations for the physical well-being and recreation of the individual and his proper medical care.

It is desirable for all classes of patients and pleasure seekers as well to secure their accommodations before going to any health resort. This can be done either by the indi-

vidual or his medical adviser. If it proves unsatisfactory a change can be made, but the case is then cared for at least until he can choose for himself.

For tuberculous cases, one of the best plans is to rent a small cottage and live according to his own needs and tastes. This can be done at a reasonable cost in the South. Some comforts may be missed that one can command at home, but the same is also just as true of the very rich who can afford expensive cottages and live in high priced hotels. Small cottages may be rented from 20 dols. to 25 dols. per month, not furnished, it is true, but if one is to stay several months, some furniture may be rented, and much is not needed. By following out some such plan, in which two or more might combine, the cost of living would be less than in the average hotel or better class of boarding house, and the patient much less handicapped in following systematic treatment and of consulting his own inclinations and tastes.

Considering the question from the other side, if these individuals are a menace to a community, as must be confessed in a way, such danger would be minimised by the more general adoption of this cottage system instead of their being crowded together in inadequate and uncomfortable boarding houses or even hotels.

For all classes of cases and those in search of a pleasant place of sojourn where the rigors of the northern winter may be avoided, I may state that the South has undergone an almost magical change in the last fifteen or twenty years. The blight and desolation, the distressing poverty which the reverses of the Civil War brought have been overcome ; and while the old plantation with many of the good things that went with it are now matters of history and treasured memory merely, the South is to-day richer and better equipped in point of comfort than ever before in its history. The im-

provements which you note in the railroads of your various sections are paralleled in various sections of the South, so that one may travel with as much comfort from New York to Palm Beach as from New York to Chicago, and from Chicago to Southern Florida as from that city to California.

Unfortunately the limits of this paper will not admit of my going into minute details concerning the especial points of attraction of any individual location. It may be stated generally, however, concerning all the places mentioned, that the railroad facilities for reaching them are modern and comfortable, as are also the hotel accommodations and many of the boarding houses. In nearly every instance one will find attractive country clubs, with opportunities for golf, lawn tennis, &c. In each place there are located good livery stables and in most of these localities the roads are good for riding, driving or automobiling.

Game is abundant in many of these sections, and fishing is good. In addition to this, one may obtain surf bathing at Palm Beach. Indeed, it may be said, in brief, that the demands of the health and the pleasure seeker have been met to such an extent that one may sojourn in comfort and find attractive out-of-door amusement in any of these places. To avoid over-crowding, however, it is best to engage one's boarding accommodation in advance, for it must be admitted that the number of visitors in many of these localities largely exceeds the ability to properly house them.

The following tables give the meteorological data of the places named.

AIKEN, SOUTH CAROLINA, VOLUNTARY OBSERVER, PERIOD OF OBSERVATION 1888-1894.

Mean temperature...	November ...	...	53·54
,, ,, ...	December ...	...	48·89
,, ,, ...	January ...	...	45·75
,, ,, ...	February ...	...	50·27
,, ,, ...	March ...	...	53·36
,, ,, ...	April ...	...	58·88

Mean temperature from maximum and minimum	November	55·30
,, ,, ,, ,, ,,	December	50·71
,, ,, ,, ,, ,,	January	47·87
,, ,, ,, ,, ,,	February	52·01
,, ,, ,, ,, ,,	March	52·03
,, ,, ,, ,, ,,	April	64·33
Mean barometer	November	29·623
,, ,, ...	December	29·540
,, ,, ...	January	29·615
,, ,, ...	February	29·622
,, ,, ...	March	29·494
,, ,, ...	April	29·547
Direction of prevailing wind	November	S.W.
,, ,, ,, ...	December	W. & S.W.
,, ,, ,, ...	January	N.E.
,, ,, ,, ...	February	S.W.
,, ,, ,, ...	March	S.W.
,, ,, ,, ...	April	S.W.
Mean relative humidity	November	59·65
,, ,, ,, ...	December	58·58
,, ,, ,, ...	January	63·17
,, ,, ,, ...	February	60·31
,, ,, ,, ...	March	57·90
,, ,, ,, ...	April	52·78
Average number clear days	November	27
,, ,, ,, ,, ...	December	26
,, ,, ,, ,, ...	January	23
,, ,, ,, ,, ...	February	24
,, ,, ,, ,, ...	March	26
,, ,, ,, ,, ...	April	29
Average number rainy and cloudy days... ...	November	3
,, ,, ,, ,, ,, ...	December	5
,, ,, ,, ,, ,, ...	January	8
,, ,, ,, ,, ,, ...	February	4
,, ,, ,, ,, ,, ...	March	5
,, ,, ,, ,, ,, ...	April	2
Mean rainfall in inches	November	1·33
,, ,, ,, ...	December	2·65
,, ,, ,, ...	January	4·68
,, ,, ,, ...	February	4·35
,, ,, ,, ...	March	6·07
,, ,, ,, ...	April	2·33

Columbia, S.C., and Camden, S.C.

Repeated efforts to get reliable data from these two places have resulted in failure. The data from Columbia were obtained, but the report was so full of inaccuracies that the author considered it best to leave this section out entirely rather than put in figures that were misleading. Columbia and Camden are located about 84 miles north of Augusta, Ga., and the former occupies approximately the same distance from the sea, Camden being about 40 miles due east. The former is a city of about 35,000 inhabitants, and is attractive from a business and residential standpoint. The latter is a village located in a rocky section of S.C., and for many years has been popular as a winter health resort. Columbia being situated only about 84 miles north of Augusta, Ga., one may form a reasonable estimate of the climatic conditions.

Climate of Palm Beach, Fla. Lon. 29°-51′.

Palm Beach and Miami are situated further south than any important health resort in Florida. Palm Beach is 200 miles south of Jacksonville, on a long narrow strip of land, with the Atlantic Ocean on one side and Lake Worth on the other. The two largest winter resort hotels in the south are located here and numerous other smaller boarding places for the accommodation of guests.

The tourist season is short, not really beginning until the middle of January and practically ending in from six weeks to two months. It is, nevertheless, at this time the most popular and fashionable winter resort in the south. The United States has no weather station at this resort, but Jupiter, just 17 miles north of Palm Beach, possesses practically the same climatic conditions.

CLIMATE OF ASHEVILLE, N.C. LATITUDE, 35° 36′ N.; LONGITUDE, 82° 28′ W.

	January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.
TEMPERATURE:												
Normal for * years	37°	40°	47°	54°	63°	69°	72°	70°	65°	55°	46°	40°
Average daily range for 3 years ...	19	20	20	21	21	21	21	19	22	26	21	18
Mean of maximum for 3 years	43	46	60	63	74	78	82	81	76	68	56	46
,, minimum ,, 3 ,, ...	24	27	40	42	53	58	61	62	54	42	35	28
Highest of maximum for 3 years ...	69	74	75	84	90	90	90	89	87	82	74	67
Lowest of minimum ,, 3 ,, ...	·1	·6	18	26	32	41	51	47	36	22	13	10
Average date of last killing frost for 3 years, April 25												
Average date of first killing frost for 3 years, October 16												
HUMIDITY:												
Average relative for 3 years	75	75	77	69	72	78	80	83	81	75	76	75
,, absolute ,, 3 ,, ...	—	—	—	—	—	—	—	—	—	—	—	—
PRECIPITATION:												
Average in inches for 3 years	4·36	3·65	4·26	3·06	3·55	3·71	4·52	4·62	3·34	2·77	2·66	2·95
WIND:												
Prevailing direction for 3 years ...	N.W.	N.W.	S.E.	N.W.	S.E.	N.W.	S.E.	S.E.	S.E.	S.E.	N.W.	N.W.
Average velocity in miles per hour ...	10	10	9	9	7	6	4	5	6	7	8	10
WEATHER:												
Average number of partly clear days for 3 years	20	18	18	18	23	22	24	24	24	27	21	20
Largest number clear days for 3 years ...	12	14	11	16	11	11	9	11	15	22	14	15
Smallest ,, ,, 3 ,, ...	8	5	3	5	7	2	2	6	8	15	8	10
Average number cloudy days for 3 years	11	10	13	12	8	8	7	7	6	4	9	11
Largest ,, ,, 3 ,,	12	17	16	13	14	8	12	8	9	10	12	15
Smallest ,, ,, 3 ,,	10	5	10	2	2	6	2	4	1	2	7	7
Average number rainy days for 3 years...	9	9	14	11	13	14	14	15	7	5	6	8
Smallest ,, ,, 3 ,, ...	7	7	12	7	9	10	11	14	3	1	5	5
Largest ,, ,, 3 ,, ...	12	11	15	12	18	17	19	16	12	8	8	11

* Interpolated from Charlotte and Knoxville data.

CLIMATE OF ATLANTA, GA. LATITUDE, 33° 45′ N.; LONGITUDE, 84° 23′ W.

	January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.	Annual
TEMPERATURE:													
Average or normal for 19 years	42°	47°	52°	62°	69°	76°	78°	77°	72°	62°	52°	45°	61°
,, daily range for 19 years ...	16	16	18	19	19	18	17	16	17	18	17	16	17
Mean of warmest for 19 years	50	55	61	71	78	85	87	85	81	71	60	53	70
,, coldest ,, 19 ,, ...	35	39	43	52	60	67	70	68	64	53	43	37	53
Highest of maximum for 19 years ...	75	78	83	89	91	98	100	96	97	91	82	72	100
Lowest of minimum ,, 19 ,, ...	−2	−8	17	25	39	39	58	55	43	30	16	1	−8
Average date of last killing frost for 27 years, March 24													
Average date of first killing frost for 27 years, November 7													
HUMIDITY:													
Average relative for 5 years	77	74	70	65	67	71	76	78	74	68	74	77	72
,, absolute ,, 5 ,, ...	Not recorded.												
PRECIPITATION:													
Average in inches for 19 years	5·86	4·84	5·89	3·62	3·29	4·08	4·62	4·64	3·58	2·19	3·56	4·21	50 24
WIND:													
Prevailing direction for 19 years ...	N.W.	N.W.	N.W.	N.W.	N.W.	N.W.	N.W.	E.	E.	N.W.	N.W.	N.W.	N.W.
Average velocity in miles per hour ...	11·0	11 2	10·9	9·7	8·2	7·5	7·3	6·8	8·0	9·0	9·7	10·0	9·2
WEATHER (1900–04 inclusive):													
Average number clear and fair days for 5 years	9	8	8	9	11	11	13	12	12	12	10	10	124
Largest number clear days for 5 years ...	13	9	13	11	16	14	14	17	18	23	15	17	148
Smallest ,, ,, 5 ,, ...	7	6	5	6	5	0	5	2	7	8	6	9	105
Average number cloudy days for 5 years	12	13	15	12	8	9	6	7	6	6	10	12	116
Largest ,, ,, 5 ,,	16	15	23	16	15	22	7	11	12	14	14	14	140
Smallest ,, ,, 5 ,,	10	8	9	8	5	2	3	5	3	2	5	10	86
Average number rainy days for 5 years...	11	11	13	11	8	12	10	12	6	5	8	10	118
Smallest ,, ,, 5 ,, ...	9	8	10	9	6	7	9	6	2	1	4	7	111
Largest ,, ,, 5 ,, ...	13	13	16	14	11	19	11	19	12	10	11	14	125

CLIMATE OF AUGUSTA, GA. LATITUDE, 32° 28′ N.; LONGITUDE, 81° 54′ W.

	January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.
TEMPERATURE:												
Average or normal for 29 years	47°	50°	56°	54°	73°	79°	81°	79°	75°	64°	54°	48°
,, daily range for 20 years ..	18·1	19·4	21·4	22	21·9	19·9	19	18·3	18·5	20·8	20·7	19·5
Mean of warmest for 29 years	56	58	62	69	77	83	85	84	79	71	60	57
,, coldest ,, 29 ,, ...	39	38	50	59	69	74	78	76	70	58	48	38
Highest of maximum for 29 years ...	80	84	89	93	100	103	105	105	101	94	85	78
Lowest of minimum ,, 29 ,, ...	6	3	22	29	41	46	57	58	41	29	23	7
Average date of last killing frost for 29 years, March 18												
Average date of first killing frost for 29 years, November 8												
HUMIDITY:												
Average relative for 5 years	74	71	70	66	66	70	76	80	74	74	78	76
,, absolute ,, 5 ,, ...	2·457	2·550	3·414	3·936	5·555	7·441	7·980	8·240	6·563	4·372	3·539	2·366
PRECIPITATION:												
Average in inches for 29 years	4·35	4·30	4·97	3·48	3·28	4·50	5·52	5·27	3·80	2·42	3·08	3·36
WIND:												
Prevailing direction for 29 years ...	W.	W.	W.	W.	S.E.	S.	S.E.	N.E.	N.E.	N.E.	N.E.	W.
Average velocity in miles per hour ...	4·5	7·0	7·0	6·5	5·8	5·4	5·1	5·0	5·2	6·2	5·5	6·0
WEATHER:												
Average number clear and fair days for 5 years	20	18	22	23	25	23	23	23	23	25	22	21
Largest number clear days for 5 years ...	19	23	22	25	28	29	26	26	27	27	25	24
Smallest ,, ,, 5 ,, ...	16	14	12	22	22	23	19	18	21	21	19	19
Average number cloudy days for 5 years	11	10	9	7	6	7	8	8	7	6	8	10
Largest ,, ,, 5 ,,	15	14	19	8	9	7	12	13	9	10	11	12
Smallest ,, ,, 5 ,,	12	5	9	5	3	1	5	5	3	4	5	7
Average number rainy days for 29 years...	11	10	10	8	8	11	12	13	7	7	8	9
Smallest ,, ,, 5 ,, ...	7	2	9	7	3	6	8	10	5	2	5	6
Largest ,, ,, 5 ,, ...	13	14	15	11	13	15	13	19	8	8	13	11

CLIMATE OF CHARLESTON, S.C. LATITUDE, 32° 47′ N.; LONGITUDE, 79° 56′ W.

	January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.
TEMPERATURE:												
Average or normal for 30 years	50°	53°	57°	65°	73°	79°	82°	81°	76°	67°	58°	52°
,, daily range for — years ...	—	—	—	—	—	—	—	—	—	—	—	—
Mean of warmest for 34 years	59	61	64	70	77	83	85	84	80	72	63	60
,, coldest ,, 34 ,, ...	43	41	51	59	69	76	79	78	72	62	53	44
Highest of maximum for 34 years ...	80	80	86	89	98	100	104	100	95	93	83	78
Lowest of minimum ,, 34 ,, ...	10	7	24	32	45	51	64	62	49	39	23	13
Average date of last killing frost for 30 years, March 1												
Average date of first killing frost for 30 years, November 30												
HUMIDITY:												
Average relative for 5 years	77	75	74	73	74	76	77	79	79	77	76	76
,, absolute ,, 5 ,, ...	3·138	3·394	3·842	4·950	6·498	8·057	8·952	8·9 7	7 6·7	5·576	4·081	3·322
PRECIPITATION:												
Average in inches for 35 years	3·56	3·39	3·68	3·08	3·54	5·30	7·34	7·17	5·35	3·93	2·86	3·16
WIND:												
Prevailing direction for 30 years ...	N.	S.W.	S.W.	S.W.	S.W.	S.W.	S.W.	S.W.	N.E.	N.E.	N.E.	N.E.
Average velocity in miles per hour, 20 years	8·4	9·2	9·2	9·4	9·0	8·6	8·0	7·7	8·5	9·0	7·8	8·0
WEATHER:												
Average number clear and fair days for 5 years	10	7	9	12	9	6	7	6	7	11	12	10
Largest number clear days for 5 years ...	14	11	14	14	12	12	9	9	9	15	18	14
Smallest ,, ,, 5 ,, ...	2	4	2	10	6	2	3	2	4	8	8	9
Average number cloudy days for 5 years	8	10	7	4	5	3	5	5	6	6	7	9
Largest ,, ,, 5 ,,	12	12	8	5	10	0	8	9	7	10	9	12
Smallest ,, ,, 5 ,,	5	8	4	3	2	1	3	3	5	3	5	5
Average number rainy days for 5 years...	9	10	10	6	10	12	13	13	9	6	7	10
Smallest ,, ,, 5 ,, ...	3	8	7	3	6	8	9	10	6	5	3	7
Largest ,, ,, 5 ,, ...	14	11	12	9	15	17	16	16	12	8	9	13

CLIMATE OF JACKSONVILLE, FLA. LATITUDE, 30° 15′ N.; LONGITUDE, 82° 00′ W.

	January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.
TEMPERATURE:												
Average or normal for 34 years	54·8°	57·8°	62·7°	68·5°	75·2°	80·0°	82·1°	81·5°	78·0°	70·4°	62·3°	56·1°
,, daily range for 34 years ...	18	18	18	19	18	17	17	16	15	15	17	18
Mean of warmest for 34 years	63	66	69	73	78	83	85	84	81	76	67	63
,, coldest ,, 34 ,, ...	49	48	58	63	72	77	80	79	76	65	56	49
Highest of maximum for 34 years ...	81	86	88	92	98	101	104	101	98	92	86	81
Lowest of minimum ,, 34 ,, ...	15	10	26	34	46	54	66	64	49	40	26	14
Average date of last killing frost for 34 years, February 19												
Average date of first killing frost for 34 years, December 7												
HUMIDITY:												
Average relative for 5 years	79	76	77	69	76	79	79	81	83	82	80	78
,, absolute ,, 5 ,, ...	No record of this											
PRECIPITATION:												
Average in inches for 34 years	3·08	3·39	3·50	2·80	4·02	5·43	6·16	6·20	8·10	5·15	2·39	3·06
WIND:												
Prevailing direction for 34 years ...	N.E.	N.E.	S.W.	N.E.	N.E.	S.W.	S.W.	S.W.	N.E.	N.E.	N.E.	N.
Average velocity in miles per hour ...	7	7	8	8	7	7	7	6	7	7	7	7
WEATHER:												
Average number clear and partly clear days for 5 years	22	19	24	24	26	23	24	25	21	23	22	22
Largest number clear days for 5 years ...	15	14	13	19	17	16	14	15	11	14	20	18
Smallest ,, ,, 5 ,, ...	6	5	4	14	7	3	6	5	3	5	5	4
Average number cloudy days for 5 years	9	9	7	6	5	7	7	6	9	8	8	9
Largest ,, ,, 5 ,,	20	16	14	7	12	7	14	10	14	15	12	21
Smallest ,, ,, 5 ,,	8	5	5	2	1	3	5	5	6	6	6	5
Average number rainy days for 5 years...	9	9	8	7	9	13	15	15	14	10	8	8
Smallest ,, ,, 5 ,, ...	3	7	6	4	6	7	11	11	8	7	4	5
Largest ,, ,, 5 ,, ..	14	14	14	6	16	14	18	22	17	15	12	15

CLIMATE OF JUPITER, FA. LATITUDE, 26° 57′ N.; LONGITUDE, 80° 7′ W.

	January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.	Annual
TEMPERATURE:													
Average or normal for 18 years	65·7°	67·1°	67·8°	72·0°	75·8°	79·0°	80·8°	81·0°	79·6°	75·4°	71·8°	66·7°	73·6°
,, daily range for 18 years ...	14·3	13·3	13·5	13·4	13·1	12·3	12·1	12·0	11·3	11·1	11·7	13·1	12·7
Mean of warmest for 18 years	72·2	71·6	73·7	74·0	78·7	81·0	81·6	83·2	81·7	79·1	74·3	70·6	
,, coldest ,, 18 ,, ...	60·0	58·4	64·8	69·0	74·4	77·4	79·8	80·0	77·8	73·6	65·5	62·6	
Highest of maximum for 18 years ...	83	87	89	89	93	95	95	96	93	94	87	86	
Lowest of minimum ,, 18 ,, ...	24	27	33	39	53	64	68	68	61	48	42	24	
Average date of last killing frost for 18 years, February 14													
Average date of first killing frost for 18 years, December 29													
HUMIDITY:													
Average relative for 18 years	82	80	79	76	79	82	82	82	84	80	80	81	80
,, absolute ,, 5 ,, ...	—	—	—	—	—	—	—	—	—	—	—	—	—
PRECIPITATION:													
Average in inches for 18 years	3·81	2·78	3·20	2·62	4·85	6·35	5·02	5·48	9·72	5·77	2·85	3·13	
WIND:													
Prevailing direction for 18 years ...	N.W.	N.W.	S.E.	S.E.	S.E.	S.E.	S.E.	S.E.	N.E.	N.E.	E.	N.W.	S.E.
Average velocity in miles per hour ...	10·2	10·9	11·2	10·9	9·8	8·5	7·2	7·6	8·9	11·1	10·8	10·3	9·8
WEATHER:													
Average number clear and fair days for 18 years*	12	11	14	15	14	9	11	11	7	10	10	11	
	13	12	12	11	12	13	15	16	15	13	15	14	
Largest number clear days for 18 years...	18	14	23	23	26	18	23	20	16	21	19	19	
Smallest ,, ,, 18 ,, ...	5	3	6	4	0	0	0	2	0	1	2	1	
Average number cloudy days for 18 years	6	5	5	4	5	8	5	4	8	8	5	6	
Largest ,, ,, 18 ,,	15	13	12	16	15	21	10	7	18	14	13	17	
Smallest ,, ,, 18 ,,	0	2	0	0	0	1	0	1	0	3	1	1	
Average number rainy days for 18 years	10	9	7	7	10	13	13	14	18	15	10	10	
Smallest ,, ,, 18 ,,	4	3	5	3	5	3	4	6	10	4	5	3	
Largest ,, ,, 18 ,,	17	13	17	15	16	25	18	21	24	24	14	17	

* Clear and partly cloudy days.

CLIMATE OF SAVANNAH, GA. LATITUDE, 32° 5′ N.; LONGITUDE, 81° 5′ W.

	January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.
TEMPERATURE:												
Average or normal for 35 years	51°	53°	59°	66°	74°	79°	82°	81°	76°	67°	58°	52°
,, daily range for 17 years ...	16·6	16·8	17·9	16·7	16·4	16·0	15·6	14·5	13·8	15·6	17·3	17·3
Mean of warmest for 34 years	60	61	65	70	78	82	86	85	80	72	64	60
,, coldest ,, — ,, ...	44	43	52	61	69	76	79	78	72	62	53	44
Highest of maximum for 35 years ...	80	84	88	90	101	100	105	102	97	92	83	60
Lowest of minimum ,, 35 ,, ...	12	8	24	33	44	50	63	61	46	37	22	44
Average date of last killing frost for 34 years, February 27												
Average date of first killing frost for 34 years, November 26												
HUMIDITY:												
Average relative for 5 years	74	74	78	71	79	80	83	84	84	78	75	74
,, absolute ,, 5 ,, ...	—	—	—	—	—	—	—	—	—	—	—	—
PRECIPITATION:												
Average in inches for 35 years	3·09	3·34	3·67	3·09	2·92	7·62	6·11	7·67	5·59	3·55	2·41	3·10
WIND:												
Prevailing direction for 34 years ...	N.W.	N.W.	N.W.	S.	S.	S.W.	S.W.	S.W.	N.E.	N.E.	N.	N.W.
Average velocity in miles per hour ...	7·5	8·1	8·3	8·5	7·5	6·8	6·3	6·0	6·4	7·1	6·6	7·0
WEATHER:												
Average number clear and fair days for 5 years	11	8	8	13	12	12	10	9	11	14	14	12
Largest number clear days for 5 years ...	15	11	12	17	18	17	13	12	17	18	21	17
Smallest ,, ,, 5 ,, ...	5	4	2	8	6	7	5	6	7	7	11	9
Average number cloudy days for 5 years	10	11	8	5	9	4	6	7	8	7	6	10
Largest ,, ,, 5 ,,	15	19	12	10	17	7	9	10	14	14	9	20
Smallest ,, ,, 5 ,,	3	8	6	2	2	1	2	3	3	2	3	4
Average number rainy days for 5 years...	9	10	10	6	12	11	12	15	9	7	6	9
Smallest ,, ,, 5 ,, ...	2	8	7	3	7	6	9	12	5	4	2	6
Largest ,, ,, 5 ,, ...	13	12	13	9	17	17	15	21	12	10	9	14

CLIMATE OF SAN ANTONIO, TEXAS. LATITUDE, 29° 27′ N.; LONGITUDE, 98° 28′ W.

	January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.	Annual
TEMPERATURE:													
Average or normal for 20 years	52°	55°	62°	70°	75°	81°	83°	83°	78°	70°	60°	47°	69°
„ daily range for 20 years ...	..	..	..	..	..	..	..	..	..	..	..	..	21
Mean of warmest for 20 years	56	53	63	68	76	83	84	86	78	72	63	54	70
„ coldest „ 20 „	51	50	59	67	72	76	80	81	77	68	60	54	66
Highest of maximum for 20 years ...	82	90	97	99	97	103	106	103	103	97	90	86	106
Lowest of minimum „ 20 „ ...	6	4	21	35	44	51	64	57	46	37	22	15	4
Average date of last killing frost for 20 years, February 25													
Average date of first killing frost for 20 years, November 30													
HUMIDITY:													
Average relative for 5 years	..	..	..	..	..	..	..	..	..	..	..	..	67
„ absolute „ 5 „	..	..	..	..	..	..	..	..	..	..	..	..	4·97
PRECIPITATION:													
Average in inches for 20 years	1·87	1·89	1·67	2·77	2·97	2·85	2·28	2·91	2·83	1·45	1·78	1·65	26·74
WIND:													
Prevailing direction for 20 years ...	..	..	..	..	..	..	..	..	..	..	..	..	S.E.
Average velocity in miles per hour ...	..	..	..	..	..	..	..	..	..	..	..	..	7·4
WEATHER:													
Average number clear and fair days for 5 years	..	..	..	..	..	..	..	..	..	..	..	..	270
Largest number clear days for 5 years ...	..	..	..	..	..	..	..	..	....	..	..	..	143
Smallest „ „ 5 „ ...	..	..	..	..	..	..	..	..	..	..	..	..	121
Average number cloudy days for 5 years	..	..	..	..	..	..	..	..	..	..	..	..	93
Largest „ „ 5 „	..	..	..	..	..	..	..	..	..	..	..	..	115
Smallest „ „ 5 „	..	..	..	..	..	..	..	..	..	..	..	..	68
Average number rainy days for 5 years	..	..	..	..	..	..	..	..	..	..	..	..	81
Smallest „ „ 5 „	..	..	..	..	..	..	..	..	..	..	..	..	71
Largest „ „ 5 „	..	..	..	..	..	..	..	..	..	..	..	..	96

Climate of Summerville, South Carolina, January, 1899, to January, 1903. (Dr. A. H. Hoyden.)

	Nov.	Dec.	Jan.	Feb.	March	April	July	Sept.
Temperature Deg. F.—								
Average mean ...	59·3	47·5	46·8	46·6	54·4	59·2	80·1	72·5
,, maximum ...	79·5	74·7	74·8	76·2	81·2	83·7	96·2	91
,, minimum ...	29·5	19	21·4	16·7	27·6	34·7	65·2	53·5
Mean maximum ...	66·5	58·7	58·4	56·3	67·7	68·1	88·3	82·7
,, minimum ...	51·2	46·2	36·8	37·1	44·9	50·2	71·2	65·2
Average daily range...	15·3	12·5	21·6	19·2	22·8	17·9	17·1	17·5
,, monthly range	51·2	55	53·4	57·4	53·6	49	31	37·5
,, relative humidity	77·4	76·8	70·8	70·9	72·5	73	83·5	79·5
Precipitation average in inches	2·77	3·73	3·49	4·67	3·01	4·08	5·25	3·56
Previous direction of winds	N.E.	S.W.	N.E.	S.W.	S.—N.W.	S.W.	S.E.	S.W.—N.E.
Weather—								
Average No. clear days	18·2	15	13	10·4	13·4	15·7	15 2	19·7
,, ,, fair days	6·7	7·5	9·2	10	11·2	9·2	12·5	5·2
,, ,, clear and fair days	24·9	22·5	22·2	20·4	24·6	24·9	27·7	24·9
Average number of cloudy days	5	8·2	8·8	7·6	6·4	5	3·2	5

Not to be confounded with Summerville, Augusta, Ga.

DISCUSSION.

Dr. R G. Curtin (Philadelphia): The suggestion of the doctor that one should secure proper accommodation before starting from home is very important. I know that at the present time they are refusing tuberculous patients at many pleasure resorts formerly health resorts. I know the last patient I sent to Pinehurst was one with anæmia; and she was told not to get off at that place, as she would be unable to find a place to stay because she had consumption. I sent a second patient to Asheville, and the train porter said that he would not be received there in any of the hotels; and the patient had to go further south in search of a stopping-place.

Dr. T. D. Coleman (Augusta, Ga., closing) : My object in preparing this paper, and it did involve a great amount of work, was to put into one monograph accurate data concerning the more important winter resorts of the south, so that they may be readily referred to by members of the profession when occasion demanded. The time has come for us to study the particular place we send our patients to. The south is a wide country, and to send patients south without a definite knowledge of the particular place is unwise.

CEREBRO-SPINAL MENINGITIS.

BY THOMAS DARLINGTON, M.D.
NEW YORK CITY.

DURING the past forty years there have been four outbreaks of epidemic cerebro-spinal meningitis in New York City. The first, and up to that of 1904 and 1905 the most severe, was in 1872, when there were 782 deaths—a death-rate of 8·70. In 1881 and 1893 the outbreaks were not so severe, the number of deaths being respectively 461 and 469, and the death rates 3·70 and 2·67. The latest epidemic, the severest in the history of the city, began in the early months of 1904, and continued through 1905. During 1904 there were 1,083 deaths, a death-rate of 4·6; during 1905, 1,511 deaths—a death-rate of 6·3.

The winters of 1872, 1881, 1893 and 1904 were what are known as "hard winters," being cold, with considerable snow. The disease has always remained abnormally prevalent for a year or two after each outbreak, but up to the present one the number of cases during the second year was considerably less. In 1905, however, the epidemic was much more severe than in the preceding year.

The following table gives the number of cases and deaths from cerebro-spinal meningitis in the old city of New York (Boroughs of Manhattan and The Bronx) from 1866 to 1905.

This table shows the periodicity (about every ten years) of the outbreaks, and the greater severity of the 1904-1905 epidemic; there is a lack of correspondence between the

general death-rate and that from cerebro-spinal meningitis. Only in 1904 did the two rise together, while in 1905 the former fell while the latter rose.

TABLE I.

Deaths from Cerebro-Spinal Meningitis in the Old City of New York (Manhattan and The Bronx), with Populations and Death-Rates per 10,000.

Year	Population	Number of deaths	Death-rate	Year	Population	Number of deaths	Death-rate
1866	767,979	18	·23	1887	1,479,143	203	1·37
1867	808,489	33	·40	1888	1,522,341	173	1·14
1868	851,137	34	·39	1889	1,566,801	145	·93
1869	896,034	42	·47	1890	1,612,559	136	·84
1870	943,300	32	·34	1891	1,659,654	189	1·14
1871	955,921	48	·50	1892	1,708,124	230	1·35
1872	968,710	782	8·07	1893	1,758,010	469	2·67
1873	981,671	290	2·95	1894	1,809,353	213	1·18
1874	1,030,607	158	1·53	1895	1,873,201	204	1·09
1875	1,044,396	146	1·40	1896	1,906,139	178	·93
1876	1,075,532	127	1·18	1897	1,940,553	232	1·20
1877	1,107,597	116	1·05	1898	1,976,572	258	1·31
1878	1,140,617	97	·85	1899	2,014,330	287	1·42
1879	1,174,621	108	·92	1900	2,055,714	201	·97
1880	1,209,196	170	1·41	1901	2,188,209	201	·94
1881	1,244,511	461	3·70	1902	2,182,836	190	·87
1882	1,280,857	238	1·86	1903	2,249,680	195	·86
1883	1,318,264	223	1·69	1904	2,318,831	1,083	4·6
1884	1,356,764	210	1·55	1905	2,390,382	1,511	6·3
1885	1,396,388	202	1·45	1906			
1886	1,437,170	223	1·55	1907			

In 1905, the epidemic began earlier in the year by over a month than in 1904, reached its highest point seven weeks earlier, exhibited a recrudescence early in May, another slight one in July, and died away about two weeks later.

The disease was most prevalent among the poorer classes and in the densely settled districts. Italians are extremely subject to the disease, and the cases were most numerous on the lower East Side, the lower middle West Side, and the upper East Side (Little Italy).

The deaths for 1904, arranged by wards, are given in the following table :—

Table of Deaths from Cerebro-Spinal Meningitis, by Wards, for the Year 1904.—*Borough of Manhattan.*

Ward	Population census, 1900	Number of deaths	Death-rate per 10,000	Prevailing foreign population
1	9,516	5	5·25	Irish, Syrian.
2	1,488	1	6·72	Irish.
3	1,797	1	5·56	Irish.
4	19,554	30	15·34	Italian.
5	8,298	11	13·26	Irish, Italian.
6	20,004	30	15·00	Chinese, Italian.
7	89,237	83	9·30	Irish, Jews.
8	29,059	31	10·67	Italian, Irish.
9	59,650	41	6·87	Negroes, Irish.
10	71,879	45	6·26	Hebrews.
11	99,144	38	3·83	Jews.
12	476,602	174	3·65	Jews, Italians.
13	64,117	41	6·40	Roumanians, Jews.
14	34,035	44	12·93	Italians.
15	24,066	14	5·82	Italians.
16	52,808	27	5·11	Irish, French.
17	130,796	104	7·95	Hungarians, Jews.
18	61,325	39	6·36	Jews.
19	257,448	94	3·65	Bohemians, Hebrews.
20	89,798	45	5·01	Negroes.
21	60,211	35	5·81	Irish, Americans.
22	189,261	70	3·70	Negroes, Italians.
Total ...	1,850,093	1,003	5·42	

It will be noted that the high death-rates (15·34 for the fourth ward, 15 for the sixth ward, &c.) occur in the wards in which Italians constitute the majority of the foreign population.

An attempt was made to investigate the disease during the spring of 1904, but no definite information was obtained beyond certain facts going to show that infection might be carried by means of the discharges from the body of the patient.

When cerebro-spinal meningitis again became prevalent, shortly after the beginning of 1905, the Board of Health determined to do all in its power to investigate the disease, particularly as to its mode of spread and possible modes of prevention. To this end, following the same procedure

adopted in the case of the acute respiratory diseases, a commission for the investigation of cerebro-spinal meningitis was appointed. It is composed of the following physicians : Dr. Thomas Darlington, President Board of Health ; Dr. Hermann M. Biggs, Medical Officer ; Dr. W. K. Draper ; Dr. E. K. Dunham ; Dr. Simon Flexner ; Dr. Walter B. James ; Dr. William L. Polk ; Dr. William P. Northrup ; Dr. Joshua Van Cott ; Dr. Elser.

The commission had its first meeting on March 24, 1905, when it divided into clinical and bacteriological sections, each section to work along those respective lines.

Bacteriological Section.

To show the importance of the investigation of the meningitis germ, one may only say that the germ which is frequently found to be associated with an ordinary cold, both under the microscope and in cultures, is like the germ that produces meningitis. The question immediately arises, " Are these germs generally prevalent, like the pneumococci, or are they other or different strains, and not the same germ ? And if so, " Are the germs of meningitis rare, and confined only to the sick or those in immediate contact and attendance upon the sick ? " The answer to this question would determine largely the course of action.

Although the Commission has not yet completed its labours, I am able to present at least some of its findings to you this evening.

It is now everywhere conceded that the epidemic form of cerebro-spinal meningitis is caused by the diplococcus intracellularis discovered by Weichselbaum in 1887. The main problem, therefore, was to determine the occurrence of this organism and the way in which it is transmitted.

Before speaking of our own studies on the occurrence

of the meningococcus, I may remind you that a large number of observers claim to have demonstrated this organism in the nasal secretion of persons suffering from this disease. Investigation, however, has shown that but few of them can be accepted, for in the majority of instances the work consisted merely in finding diplococci, which resembled the meningococci. We now know that there may be a number of such organisms in nasal mucus, but that these are not meningococci. Among these the micrococcus catarrhalis is especially disturbing, because even culturally it has certain features in common with the meningococcus.

In order, therefore, to determine the occurrence of meningococci in nasal mucus, cultures were made from 152 persons, including about equal numbers of those suffering from cerebro-spinal meningitis, and those in close contact with such cases, and those known to have been near cases of meningitis. The cultures isolated were all carefully studied in order to identify them as meningococci. The results may be summarised as follows :—

Fifty-two cases of cerebro-spinal meningitis were examined. Meningococci were isolated from 12 of the 22 examined during the first week; and from 5 of the 15 examined during the second week. In 6 cases examined during the third week, 3 during the fourth, and 6 between the sixth and ninth weeks, no meningococci were found, while in a very severe case examined on the sixty-seventh day, a few meningococci were found.

It should be remembered that in some of the cases the plate cultures made showed almost 95° of the colonies to be meningococci, while very often they were fully half of all the bacteria present.

The nasal secretion of forty-five healthy persons living in close contact with meningitis patients were examined. In five of them meningococci were isolated during the first two weeks of the patient's illness.

In the nasal mucus of fifty-five first year medical students, who had never been in known contact with meningitis, a few organisms were found which were shown not to be meningococci.

So much, then, for the occurrence of the meningococcus, the significance of which I shall discuss later.

The mode of transmission was studied principally by means of a clinical study of the cases reported to the department.

During the past winter, all the cases of cerebro-spinal meningitis were carefully indexed by the card system, and arranged according to street address. An examination of these cards showed that several cases were sometimes reported from one house. It was felt that a careful study of such instances would be more apt to throw light on the mode of transmission than would an analysis of the other cases. (Clinical evidence of communication.)

Out of about 1,500 cases, 200 were found to have occurred two or more in one house, *i.e.*, there were eighty-eight instances where more than one case was reported from one house. Lack of time prevented the investigation of all these eighty-eight instances, but fifty-eight instances, representing 144 cases, were carefully studied.

In 39 instances there were	2	cases to a house	...	78	cases
,, 15	,,	,,	3	,,	,,	...	45	,,
,, 2	,,	,,	4	,,	,,	...	8	,,
,, 1	,,	,,	5	,,	,,	...	5	,,
,, 1	,,	,,	8	,,	,,	...	8	,,
					Total	...	144	,,

In three of these instances encountered, the disease occurred in the families of janitors, and seems to have been communicated to or by them in the ordinary intercourse with the tenants. (Cases ‡9, 34, 49.)

In two instances the disease appears to have been contracted in school (44*b*, 45*b*).

In four instances mothers or other relatives taking care of children suffering from cerebro-spinal meningitis developed the disease (‡29, 42, 52, 55). Case ‡7 of this series is of particular interest, for it throws some light on the period of incubation. In this case two children developed the disease within two days of each other, and the only contact between them had occurred a day previous to the onset in one of them. If both children became infected from a common source, the incubation period is one day for one child and two days for the other. If, however, the second child was infected from the first, the incubation period is exactly three days. The latter assumption seems the more likely, for this period agrees more closely with the other cases in the literature.

So far as immunity and susceptibility are concerned, I may say that in two instances of this series of 144 cases, the disease had occurred in the same family a year ago (‡12 and 52). It is possible that cases 11, 33, 37 and 57 may also be instances of special susceptibility, for in all these all the children of the family developed the disease. The same may apply to case 51, in which four out of five children were attacked. The presence of a special susceptibility is perhaps also indicated by the fact that in most of the families investigated, only one or two children out of several were affected. On analysing the histories of forty-five families, in which the number of children is noted, it was found that these families had a total of 210 children. Of these 210, 63 became infected, while 147, who were probably equally exposed to infection, escaped. Since our own investigations have shown that many healthy persons in contact with cases of cerebro-spinal meningitis may harbour meningococci in their noses, it would appear that these persons were more or less immune to such infection. This immunity, of course, can be conceived as being either local (nose or meninges) or general.

Clinical Section.

At the same time a corps of inspectors was organised for the investigation of the disease. The physicians were specially selected for the purpose and further fitted themselves by observing a large number of cases of cerebro-spinal meningitis in the hospitals.

The commission urging that lumbar puncture be done in every instance for the purpose of diagnosis, of relief of pressure symptoms, and of providing material for bacteriological purposes, a special inspector of this department was assigned to the performance of this operation when requested by physicians.

The subcutaneous and intraspinous administration of diphtheria antitoxin having been strongly recommended by certain physicians and institutions, the Department of Health put the services of the diphtheria antitoxin inspectors at the disposal of physicians desiring that mode of treatment. The department, even at that time, took no stand for or against this line of treatment; since then, experience has shown it to be useless.

On April 19, 1905, the Board of Health declared cerebro-spinal meningitis to be a communicable disease and required reporting of all cases, enforcement of quarantine, isolation of patients, exclusion of other children in the family from school, and disinfection of premises and bedding on termination of the disease. Supervision of the disease to be carried out by the medical inspectors of the department.

Routine Procedure.—Cases are reported to the Department of Health (1) by physicians and institutions on postal cards; (2) by the Diagnosis Laboratory as the result of examination of spinal fluid; (3) by death certificates; and (4) by complaints. A full history is obtained by a medical inspector of each case (home surroundings, symptoms, outcome, &c.) on the attached card.

DEPARTMENT OF HEALTH—THE CITY OF NEW YORK.

COMMISSION FOR THE INVESTIGATION OF CEREBRO-SPINAL MENINGITIS.

Record No..... Reported by..... Address.....
Date.....Card, Lab., Comp., Tel., Assigned.....to.....Returned.....
Name.....Address..... Floor..... Borough.....
Age...M. F., Race.....P. H., Hot., Apart., Flat, Ten., B. H., No. Families.....
Sanitary Conditions: Halls..... Areaway.....
Yard.....Street.....
Other cases C.S.M., in house or neighbourhood.....
No. rooms occupied.....Total air space.....cu. ft. Ventilation.....Light.....
Heat.....Plumbing.....No. in family.....Adults.....Children.....
General Cleanliness and Sanitation.....
Prevalence of dust.....
Parasites (Fleas, B. B. Pedic.).....Animal Pets..... .....
PATIENTS' HISTORY:.....Child, Breast, Bottle, Prev. dis. (diphth.).....
.....
Pres. Health as to Throat, Nose, Ear, Mouth.....
Clothing.....Food.....Personal Cleanliness.....
School..... Playground.....Workplace.....
Susceptibility to colds.....Exposure to C.S.M.....
Exposure to over-exertion, mental or physical, or overheating .....
Exposure to cold, damp, sudden temperature changes.....
Health at onset.....Onset, date.....Character.....
Stiffness Neck..... Headache.....Convulsions.....Vomiting.....
Eruption, Petechiæ, Herpes.....Nasal discharge.....Kernig's Sign.....
Temperature.....
Blood: Leucocytes.....Other Symptoms.....
Course.....
.....
Complications, Day of Devel.....Eye.....Ear.....
Pneumonia..... Paralysis.....
Others.....
.....

This, when completed, is filled according to address. Each new case reported is compared with this record. If the patient is still at home, full instructions as to the nature of the disease are given to the family verbally and by circular, isolation and quarantine are enforced, other children of the family on the premises are excluded from school, and other tenants in the house notified of the existence of the disease. The case is kept under supervision by an inspector until its termination by death, recovery, or removal. In all dead cases not previously reported during life, an explanation is demanded and obtained from the attending physician. On termination of the case, disinfection of the premises and bedding is ordered.

To make sure that knowledge of all cases reached the Department, every death from meningitis (simple, tubercular, &c.) is also investigated. For results see tabulation of cases.

Circular.—A circular of information has been prepared for distribution by the medical inspectors, one being left with the family of each patient, or sent to the attending physician.

Tabulation of Cases.

As previously stated, the Department of Health has endeavoured to obtain full information regarding every case of cerebro-spinal meningitis occurring in New York City during 1905; 2,755 cases were reported, and information obtained in 2,180. The results have been tabulated and may be summarised as follows :—

Sex.—The cases were divided fairly evenly into males (55 per cent.) and females (45 per cent.), the same holding good for all boroughs.

Age.—Sixty-seven per cent. of the cases occurred in children under 10 years of age, and 15 per cent. in infants under 1 year. Only 12 per cent. of the cases were adults, and only 1 per cent. were over 50 years of age.

Nationality.—The statement that Italians are very susceptible to the disease is borne out by the fact that 15 per cent. were of that race. Excluding Americans, the Italians form 44 per cent. of the remainder. Russians came next, then Germans, and then Irish, negroes constituted only 1 per cent., and twenty-one of the twenty-two negroes lived in Manhattan.

Dwelling.—Seventy-six per cent. of the patients lived in tenement houses, showing the social status of the majority of the cases.

In 533 instances (24 per cent.) it was found that the halls, area-ways, or yards (one or all) or the streets in front of the houses, were dirty and unsanitary. In 13 per cent. the light

was bad, in 10 per cent. the ventilation was insufficient, and the plumbing unsanitary. In 16 per cent. the rooms were dirty and ill kept, and dusty. A history of the existence of parasites (fleas, &c.) was obtained in 11 per cent. and in 13 per cent. animal pets were kept.

A history of other cases of cerebro-spinal meningitis in the same house or neighbourhood was obtained in 19 per cent.

Previous History.—The commonest preceding disease was, of course, measles, followed by whooping-cough, diphtheria and pneumonia in the order named.

Present Condition.—Clothing and food were unsatisfactory in only 3 per cent., and there was a lack of personal cleanliness in 3 per cent.; 7 per cent. gave a history of susceptibility to colds.

Present Illness.—In only 6 per cent. of the cases had there been any direct exposure to other cases of cerebro-spinal meningitis, and in only a small number was there evidence of direct transmission of the disease.

In the majority of cases the patients were well just previous to the onset of the disease—only 6 per cent. being in bad health.

Symptoms.—In all but 5 per cent. the onset was sudden. Stiffness of the neck was the commonest symptom, being present in 85 per cent. of the cases, closely following it came vomiting, headache and convulsions. An eruption was present in 30 per cent. of the cases, being petechial in 19 per cent. and herpetic in 11 per cent. Nasal discharge was noted in only 13 per cent. If the disease is always transmitted by the discharges, it would seem that nasal discharge should be more common. Kernig's sign was absent in only 15 per cent. of the cases; it is of great value in diagnosis. Fever and leucocytosis are practically always present.

Complications.—The eyes are most frequently involved, next comes paralysis of other muscles, then otitis.

Diagnosis.—In 33 per cent. of the cases lumbar puncture was performed to confirm the diagnosis, and in 82 per cent. meningococci were found. In the remainder the diagnosis was made by clinical signs alone. Lumbar puncture was performed seven times in Manhattan to once in Brooklyn.

Cause of Death.—This was usually from coma and exhaustion. About 7 per cent. died on the first day, less than 34 per cent. during the first five days, and 39 per cent. after ten days. Of the recovered cases, 84 per cent. recovered completely. The majority of the cases did not recover until after the fourth week, but in ten cases (3 per cent.) recovery was stated to have taken place during the first week.

Antitoxin Cases.—Diphtheria antitoxin was used in 331 cases, of which 223 died, a mortality of 69 per cent. Careful study of the individual cases failed to show any ground for believing that the antitoxin had any beneficial effect whatsoever. In most of the recovered cases only small doses were given; and late in the disease, and in only two was more than one dose given. Whereas in several of the fatal cases very large amounts of antitoxin were used. In one case 15,000 units every other day for two weeks, a total of 115,000 units. In other cases, 60,000, 88,000 32,000 units were given; and in one case 24,000 units were given on the first day of disease. One thing is shown clearly, the harmlessness of diphtheria antitoxin.

Mistaken Diagnosis.—In 357 instances investigation showed the original diagnosis of cerebro-spinal meningitis to have been mistaken. One-third of the cases proved to be tubercular meningitis. The other conditions most frequently mistaken for cerebro-spinal meningitis were simple meningitis, gastro-enteritis and pneumonia. Of eighty-four instances of meningitis supposed not to be the epidemic cerebro-spinal form, 12 (or 14 per cent.) proved to be cerebro-spinal meningitis.

Concluding Remarks.—It will be seen by the above that clinical investigation has so far thrown very little light upon the mode of transmission of the disease, nor has any effectual mode of treatment been discovered. It is to the laboratory workers that we must look for assistance, and as stated previously, new and valuable facts have already been discovered regarding the meningococcus, its habitat, mode of transmission, viability, methods of identification, &c.

One very important point that has been brought out is that the disease is, in all probability, much more infectious during the first two weeks of its course. Guided by this, the department has enforced quarantine for at least the first two weeks in all cases remaining at their homes, the medical inspectors keeping the cases under observation, giving all necessary instructions, and ordering disinfection of the rooms and bedding on termination of the case.

The number of deaths reported in the first four months of 1906 have been 261, as compared with 804 in the same period for 1905. It is possible that the enforcement of quarantine and the performance of fumigation have had something to do with the abatement of the epidemic.

To summarise our present knowledge concerning the epidemiology of cerebro-spinal meningitis, we may say that :—

(1) The disease has occurred in several large epidemics during the past century ; sporadic cases are met with in the periods between these epidemics, and constitute the link between them.

(2) We do not know the circumstances giving rise to these epidemic outbreaks.

(3) The epidemic form of cerebro-spinal meningitis is almost invariably associated with the meningococcus of Weichselbaum ; the sporadic cases are frequently associated with this organism.

(4) During the first week of the disease, the meningo-

coccus is present in the nasal mucus in fully half of the cases ; later in the disease it is found in a smaller fraction of the cases. It also occurs in the nasal mucus of some persons who are in close contact with cases of cerebro-spinal meningitis. In the series above alluded to, this was about 10 per cent. of the persons examined.

(5) Exposure to sunlight makes infection by dust extremely improbable.

(6) The disease seems distinctly communicable in the sense that the organism is transmitted from the nasal secretion of one person to another. The transmission of the organism, however, is not synonymous with transmission of the disease.

(7) The disease in some epidemics affects mostly infants, in others older children, and sometimes chiefly adults. The reason for this is not at all clear.

(8) It seems unlikely that infection is frequently due to trauma or the result of over-exertion.

(9) Cerebro-spinal meningitis in other animals seems to have no connection with the disease in man. The subject, however, has not been sufficiently worked out to admit of positive statements.

(10) There is no evidence to show that the disease is carried by vermin or insects.

(11) The susceptibility of the individual is an important factor in the development of the disease.

(12) The period of incubation is short, from one to four days.

(13) There is no evidence of the occurrence of a dwelling infection.

(14) It would seem well to isolate most cases of cerebro-spinal meningitis occurring in the crowded tenement districts.

DISCUSSION.

Dr. I. H. HANCE (Lakewood): As a result of the condition of affairs which exists in Lakewood, I would like to ask the speaker the following question:—A mother has cerebro spinal meningitis, and every known sanitary precaution is being taken; the children of this family are allowed to go to school. Is it wise, and how would he answer the objections of the other mothers in the village as to whether these children are likely to carry the infection?

Dr. R. G. CURTIN (Philadelphia): When I was resident house-physician at Blockley, in 1866, we had 280 cases of cerebro-spinal meningitis in the hospital. One patient died in four hours and a half of malignant spotted fever. Many of the cases were of a malignant type. They were taken to the general medical wards, and not a case developed among the patients, nurses or doctors.

Dr. H. P. LOOMIS (New York): We are greatly indebted to Dr. Darlington for his valuable paper. His conclusions represent a great amount of work, and they mean a great deal in the future.

Dr. J. C. WILSON (Philadelphia): In the Pennsylvania Hospital cases of cerebro-spinal meningitis were admitted to the general wards, as many as four or five at one time, and no case arose from having them there.

Dr. T. DARLINGTON (New York. Closing): There is no danger in carrying the disease from house to house where the nasal secretion is cared for, and there is no reason why these cases cannot go to any hospital, but, of course, where people are frightened, and the health officer has to take the criticisms whether he likes it or not, where there is a great deal of gossip it may be necessary to use one's own judgment. I have always been able to take what the newspapers say. Most of the time they are wrong. I don't believe it necessary to exclude any case, but where there are dirty children in school who draw into the mouth their nasal secretions in cleaning their slates, I see no reason why it would not be communicated.

SOME FORMS OF ACUTE CARDIAC DILATATION.

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Cases of chronically dilated heart are very frequently met with in practice as a result of chronic endocarditis. We also encounter them among those, particularly men, who have well-defined signs of renal disease, or of general arterio-fibrosis. Again, among the manual labouring class, strictly speaking, we find them too often as a result of arduous, continuous work; or where frequent heavy strain has occurred, large, dilated hearts are not uncommon. Of course, with an antecedent history of syphilis, or chronic alcoholism—even though the previous life work has not been unusually trying to physical strength—the dilated heart is apt frequently to become manifest, and that, too, at a somewhat early date, because degeneration of muscular tissue, as a result of diseased arteries and insufficient cardiac nutrition, is without doubt a notable and important factor in producing it. Again, many acute febrile diseases, especially those of infectious nature, unless their convalescent period be most carefully and a long while watched and cared for, are followed, sooner or later, by cardiac dilatation which has come on slowly and insidiously, perhaps, but when once developed is of bad augury for the future, since it can rarely be wholly cured and only occasionally be ameliorated to such an extent that life is relatively free from painful or distressing symptoms.

But my purpose in this paper is to study, not those

instances with which we are all familiar, but rather those to which attention has certainly been directed by many observers, but to which still belongs, as I believe, not a few notes that observation and clinical experience may add as something of more than passing interest and importance.

I shall first give thought and attention to the cardiac dilatation which shows itself *during the march* of some acute, infectious diseases, as rheumatism, pneumonia, diphtheria and influenza. I shall then speak of acute cardiac dilatation of nervous origin, due, primarily, many times to the wear and tear of an anxious and working life, but in which the strain fell far more directly upon the brain and nervous system generally than upon the muscular make up of the body. I shall finally speak of rapid or sudden cardiac dilatation which come to those whose excesses in eating, drinking, or tobacco, are notable and long continued, and who are unable to bear even temporary physical strain without experiencing painful, threatening, or alarming effects which become manifest very soon or immediately. With a few the excess habit may be limited, as far as determined, only to tobacco; and while symptoms presented are painful and annoying expressions for weeks and months, they are ultimately recovered from in most instances if the habit be entirely abandoned for a longer or shorter period, according to the constitution, age and previous health of the individual.

Acute rheumatic endocarditis in children results fatally, not by reason of the endocarditis *per se*, but because of the cardiac dilatation which follows it, "due to a toxic action of the rheumatic poison on the cardiac muscle" (Lees). Certainly there is much to justify this conviction if we consider the revelations of autopsies. In some cases, no doubt, the pronounced chronic valvular disease will sufficiently explain the cardiac enlargement also found. But in not a few others the endocardial changes are relatively so slight that we are

not satisfied they could have been the sole and sufficient cause of the cardiac dilatation. In view of Poynton and Paine's researches, the diplococci found in the heart wall, or their toxins, are probably the really efficient factors in producing it. This dilatation "tends to diminish as the rheumatic symptoms subside, and it may increase again if the rheumatism relapses."

In many cases of rheumatism acute dilatation of the heart is far more important in its immediate and remote results than any pericardial rub or endocardial murmur. Indeed, it seems as though it were primarily, to a considerable degree, the direct result of the action of the rheumatic poison on the cardiac muscle itself. Its remedial treatment consists largely in the proper use of anti-rheumatic remedies, viz., internally, salicin or the salicylates and bicarbonate of soda; and, locally, blood-letting with leeches or venesection, followed by application of the ice-bag. In this way the size of the heart can often be notably reduced, or, indeed, completely restored to its normal size and also to its normal strength. If, however, the treatment be lessened too much, or stopped too soon, a relapse to rheumatic symptoms, and particularly to cardiac dilatation, is almost sure to occur. This treatment, according to Lees,[1] should be large doses of the salicylates, combined with double the quantity of bicarbonate of soda to prevent salicylic acid poisoning and the "air lunger" so characteristic of it. In rheumatic children he finds "that after a short time 300 grs. of sodium salicylate and 600 grs. of bicarbonate of soda (in ten doses) are generally well borne, that they rarely cause vomiting, and that no depression follows." In many cases "the large doses have been continued for two or three weeks" (p. 297).

These facts, if duly corroborated by others, appear to me of the highest value. Locally, whenever there is engorgement, or dilatation of the right ventricle, leeches should first be

applied and subsequently the ice-bag in a more or less continuous manner. The latter is of service in subduing the inflammation present, and in stimulating and quieting the heart. If these methods were adopted generally they would very greatly diminish subsequent evil effects of acute cardiac dilatation in rheumatism and probably prevent a great amount of cardiac misery. No one who reads Dr. Lees' recent work carefully can fail to be forcibly impressed with the care and accuracy of his clinical observations. It is evident how important such findings are; it is also evident how valuable the methods of treatment, particularised and insisted upon, may later prove to be.

In pneumonia, and especially the cases which are serious or imminent, either from the point of view of the profound general toxæmia or from the extent of the pulmonary obstruction, dilatation of the heart in acute form is apt to be our subject of greatest, most immediate anxiety. In the former case the whole heart is involved, and no doubt the pneumococcus, either itself or its toxin, affects the muscle in its entirety and produces relaxation, loss of tone, and even degeneration, hence rapid or even sudden loss of strength in cardiac systole, and also a weak, failing, rapid or intermittent pulse. Even in these instances, and until death is very near and the respiratory centres are also directly attacked by the systemic poisoning, the pulse has an appreciable volume, though it may be easily compressed and almost obliterated. The picture is very different where the right heart dilates, and fails from its inability to overcome the ever present and perhaps increased pulmonary obstruction. In these cases, it is true, the pulse is very small, and even apparently weak. But it is not because the left ventricle has lost power or is flabby and degenerated. Rather it is that the ventricle does not receive blood enough from the lungs to contract upon it sufficiently and to cause an appreciable

pulse wave. Under these circumstances, if we percuss the heart area we find notable increase of dulness towards the right, and sometimes in the intercostal spaces on this side, notably the third and fourth, we may detect a pulsation synchronous with the cardiac beats. Moreover, there may be marked epigastric pulsation and a considerable distension of the large veins of the neck. At this stage the pulmonic second sound, which previously had been notably accentuated, owing to increased obstructive conditions in the lungs and too rapid and forcible arterial recoil under the dependence of a struggling although powerfully-acting right ventricle, has rapidly lost this accentuation and become so weak as to be scarcely audible. If with this loss of pulmonic second sound, and even though the pulse remain very small, there is no increase of or very slight dyspnœa, it may be that pulmonary obstruction is diminishing, and the prognosis of the case is brighter and more hopeful. If, on the contrary, the dyspnœa be augmented and cyanosis more marked, the outlook becomes for the while, at least, graver. In such cases Dr. A. H. Smith,[2] who described many years ago very graphically the conditions alluded to by me, would insist strongly upon the wisdom of making immediate and sufficient use of the vaso-dilators, and especially of the nitrites. The major and urgent indication is, so to speak, to bleed from the veins into the arteries. The former are blocked up and their circulation intensely impeded by an overflux of blood; the latter receive very little blood and the left heart is absolutely prevented from exercising its great power by reason of insufficiency of fluid in its cavity to permit of efficient action. If, under these circumstances, drop doses of nitroglycerine solution be given every fifteen minutes or every half hour, we may at times, and very soon, see a very great and happy change for the better. The pulse increases considerably in volume, the veins in the neck become less distended, the

dilatation of the right heart in part disappears, the right ventricular systole is more effective, and the pneumonic second sound is again audible. Dr. Smith claims, in such cases, the greater value, and freedom from objections to medication with the nitrites, to time-honoured venesection. In this I am not inclined to agree with him. On the contrary, I would hold that the preliminary blood letting is essential, as a rule, at least in moderate quantity. I prefer, however, the application of leeches or wet cups locally, to the use of the lancet. First, because I believe either of these methods causes less nervous upset than venesection; second, because despite much careful reasoning, based on physiology of the circulation, which declares the same amount of blood taken from a vein is equally beneficial with a similar amount taken locally, I still believe the contrary. I am satisfied that local blood-letting of equal amount is more effective, and relieves sooner symptoms of distress and oppression.* I believe that the reason for it may be discovered, not in the amount of blood taken from the patient, but in the reflex started locally in the right ventricle that is transmitted to the respiratory centre and from there becomes additionally stimulating to the heart. It is also true that the vaso-motor nerves are called into action through this reflex, and afford relief through dilatation of the peripheral arteries (Lees). In this condition of pulmonary obstruction and dilated right heart, we should beware the use of digitalis in preference to the vaso-dilators. Rarely, if ever, should we expect benefit from its use. Rather should we find increase of cyanosis and distension of the veins. Keep the colour florid with the use of nitroglycerine, oxygen, alcohol, and suitable diet, and, as Smith writes, we

* In this opinion I regret to find that I am not in accord with Dr. Roland G. Curtin, who writes: "There is, I think, very little, if any, benefit in local bleeding" (TRANSACTIONS AMERICAN CLIMATOLOGICAL ASSOCIATION, vol. xxi., 1905, p. 178).

shall not be ashamed of the teachings of the sphygmograph. It is far better to have a full, gaseous pulse than a small, thready one. When the latter is true, Smith has never yet seen it become fuller and slower from the effects of digitalis. It is true, however, and important to add that after the distension of the right heart has been relieved by leeches or venesection, digitalis may become very serviceable in giving strength to cardiac beats when the pulse is weak, rapid and intermittent. Digitalis is also sometimes useful, in my judgment, when the heart as a whole is affected and weakened by the toxæmia of pneumonia, and not merely in its right auricle and ventricle because of the pulmonary obstruction.

In diphtheria it not infrequently occurs, and especially in the marked toxic forms of this disease, that sudden or very rapid death takes place. This fatal termination may come during the first days of the attack. With other signs of intense poisoning the heart impulse may increase much in rapidity and feebleness. Together with these signs there may be increasing dyspnœa and pronounced pallor of face and cyanosis of lips and fingers. The face itself may partake somewhat of a dusky hue, but it is the extreme pallor, although ashy at times, which excites remark and absorbs attention. The combination of symptoms is of very bad augury. There may, or may not be, a considerable elevation of temperature (100°—102° F.). The latter point is rarely reached, and often we have only ½ to 1 degree of elevation. In times past I have seen many such cases, and, as a rule, prior to death there were already evidences in several instances of a pneumonic process in one or both lungs which had already reached the stage of consolidation. Death occurs, and the pneumonia is usually verified at the autopsy. The heart is carefully examined, and what is most marked is great distension of the right cavities with wholly cruoric clots, like currant jelly in appearance and consistence. Again, these

clots are half or more cruoric, the remainder of the clot being fibrinous. A similar clot formation extends well into the pulmonary artery, and both right auricle and ventricle are filled to repletion. The clots are formed during the agony, or one or more days preceding it. Whenever the clots are largely fibrinous, and possibly give some evidence of having the fibrin deposited in distinct layers, but above all when the marks of the pulmonary cusps are distinctly impressed upon the arterial clots and all the cruor is pressed out of them, we may feel quite confident that these thrombi were formed some time (one or more days) previous to the fatal termination. In such cases the heart muscle, if carefully examined microscopically, will show very few changes. The striæ are sometimes less well marked, and the muscular fibres are somewhat granular. It is rare, however, to find distinct fatty globules anywhere in its structure. Formerly it was stated the pneumogastric nerves showed no discoverable pathological changes. Latterly, however, Councilman and others have found nerve changes, although Schamsin denies them. The degeneration of the heart muscle is admitted by many. It seems, however, to White and Smith that degeneration of the vagus was indicated only in the severest type of heart cases. In this connection they write, "Undoubtedly heart failure not infrequently results from paralysis of the cardiac nerves (or cardiac plexus), and quite independently, too, of any anatomical changes in the heart muscle."[3] Lennox Browne also credits Vincent, of Paris, and P. Meyer, with having found "widespread parenchymatous changes in the cardiac plexus in two cases of patients dying of heart failure during convalescence from diphtheria, in which the heart muscle was unaffected."

Experimentally it has been shown that the healthy heart can rarely be over-distended, no matter how much its working capacity may be over-taxed. This is not true when

several injurious factors are combined, nor is it true when a previous infection has existed which has surely altered the heart muscle.[4] Colbeck attempts to show that all forms of dilatation indicate an absolute or relative loss of muscular tone of the organ.[5] When in diphtheria the heart itself is somewhat dilated, this dilatation affects the right cavities almost exclusively, and the left auricle and ventricle are relatively empty, and so far as one may determine are of normal size, and the muscular degeneration is less marked even than in the right heart. Formerly I regarded death in such cases as being due not infrequently to a paralysis of the heart, which came about through lack of government of the pneumogastrics, and occasioned it, doubtless, by changes in the nerve trunk itself which escaped our careful examinations. To-day I believe it more satisfactory to make a diagnosis of acute dilatation of the heart and to attribute rapid or sudden death essentially to this condition. Of course we have the complicating pneumonia and heart clot, but these might not have occurred, or indeed proved fatal, unless for the development of extreme and fatal heart weakness caused by the poison of diphtheria. I have seen death more than once occur suddenly in diphtheria. I have seen it in children, not only, as I have said, during the acute march of the disease, but after days had elapsed and the patient was nearly approaching the true convalescent period. In the latter period the patient has died suddenly when there was scarcely a warning preliminary note to tell us to be especially careful, except the fact that diphtheria had been, and it behoved us to be most watchful and insistent upon every possible protective precaution being used to prevent a most lamentable ending. I have had one of my adult patients die suddenly when doing apparently well and while sitting up in bed and playing cards with his wife. This patient had been examined by the late Prof. Austin Flint only a few hours before his

sudden death, and his heart been pronounced in good shape and no danger to be anticipated. In more than one other instance I have seen very alarming conditions of heart failure. And this goneness, faintness—with weak cardiac impulse and frequent, depressible, feeble and irregular pulse—has returned twice or several times, and during a period of a month or six weeks after the acute disease had terminated. With the heart weakness—the syncopal attacks, when the respiration was very shallow and slow—there was a certain degree of paralysis affecting the soft palate, or some of the muscles of the thorax or extremities. In such cases when I have percussed and auscultated the heart, I have been quite sure that the heart was distinctly dilated, inasmuch as both percussion and auscultation gave every sign of this condition being present. Such a condition is unquestionably remediable, not only as far as the symptoms are immediately concerned but also in regard to their future continuance. Ultimately the heart can be completely restored and be considered rightly as good as new. In other cases, especially those of adults, I doubt somewhat whether we are authorised to make unqualifiedly a favourable prognosis. At first, when attacks occur, complete bodily and mental rest is absolutely required. The patient should lie down; everything tight should be loosened or gotten rid of; smelling salts, hot water bag to præcordia and extremities made use of. Five minims of tincture of strophanthus with ammonia and brandy by the mouth, or alone hypodermically, will usually bring about a rapid temporary improvement. But to secure a complete cure of an acute cardiac dilatation of this origin requires months and years. Over-fatigue for many months should be strictly avoided. Iron, quinine and arsenic, for the secondary anæmia, must be given regularly for a while to counteract its injurious effects. Strychnine in very moderate doses will help the heart for a time and prevent in a measure

the return of syncopal tendencies. After all, however, it is country air, good nourishment, and complete rest of body and mind which shall be found really most efficacious. Time* itself will help greatly to eliminate the remains of the toxæmia from the economy, and the successful war of the protective forces of the body, little by little, get the ascendancy, and the heart itself becomes once more normal in size and force. I have seen more than once the slight beading or small warty excrescences along the free margin of the mitral valves at autopsies where death occurred during the acute period of diphtheria. I have every reason to believe that these growths are completely resorbed later, as it is a rare circumstance to recognise clearly chronic endocarditis which we could fairly attribute to a previous attack of diphtheria.

"Pathological studies have shown that the murmurs are probably due largly to relative mitral insufficiency resulting from changes in the heart muscle or to changes in the innervation of the heart."[6] It is questionable in what number of cases acute dilatation and syncope occur. Frequently the symptoms of heart failure come on gradually, and sudden death is uncommon if rational treatment be followed. It seems evident that acute dilatation of the heart is less frequent in diphtheria than in rheumatic fever. Nevertheless, in the few cases of very slow pulse there was cardiac dilatation, and in those of galop rhythm and very frequent pulse "the heart is usually moderately dilated." In practically all of the fatal cases the heart was dilated. (*Loc. cit.*, p. 438).

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* H. B. Andersson very properly lays stress upon the length of time after a severe acute disease the heart should be watched and all undue strain avoided, and even though no cardiac signs point to the existence of myocardial changes. "After a severe illness, probably a year will be required in favourable cases before the organ has regained its former strength." (*British Medical Journal*, October 7, 1905, p. 845.)

Influenza is another frequent cause of rapid cardiac dilatation. Even in the early days of the disease it may occur. And not infrequently the only satisfactory explanation of the obvious great weakness of the patient should be found in this condition. Not only is acute cardiac dilatation not infrequently met with in attacks of influenza during the first week of the disease, but subsequently, as we know, it is also encountered. These patients often get up fairly well from an acute attack and then after a few days have a sudden relapse of weakness and prostration, and are unable to meet courageously and well the ordinary duties of daily life. When the heart is auscultated and especially when it is percussed, cardiac dilatation is sometimes clearly discovered and satisfactorily accounts for many of the patient's symptoms. Again, a patient who has had a severe attack of influenza, may after a relatively long convalescence appear to be finally completely re-established in health. Without apparent or sufficient cause and despite great watchfulness or care, or sometimes, it may be, following some evident and perhaps great imprudence or strain, cardiac inadequacy manifests itself and the patient feels limp, tired, incapable of exertion. Often every other organ has been examined carefully, lungs, liver, spleen, kidneys, stomach, bowels, &c., and every one seems in fairly good shape until the heart is very carefully considered. Not seldom the dulness to the right of the sternum is apparently about normal, and there may be no marked epigastric pulsation or venous distension in the neck, but the dulness has gone up to or beyond the vertical line passing through the left nipple, and with it the first sound of the heart is indistinct, muffled, weak, distant. The area of pulsation is feeble and diffused. The point of greatest intensity of the cardiac systole is not readily made out, nor is the apex beat either visible or always palpable. The pulmonic second sound has lost the accentuation and is often

extremely indistinct, and rarely almost inaudible. "These cases," writes E. G. Wood,[7] "I take to be examples of toxic degeneration of the myocardium, with resulting loss of vitality and acute dilatation." With this opinion I cordially agree. It is in these instances when all ordinary means have failed to re-establish the health, and when the heart action remains attenuated and feeble with symptoms almost of collapse at times, that an ocean voyage is sometimes most beneficial. Nothing seems to replace the absolute rest, peace, quiet, from all disturbing elements, to the overwrought professional or business man, which can thus be obtained and only thus, in the same measure. Of course, the ocean breezes, the complete change of diet, the daily agreeable pleasant diversions of ship board, are of untold utility to some. We must, however, distinguish at times between patients who love the sea and patients who do not; between patients who are never sea-sick and those who perhaps are not actually ill, but, on the other hand, who are never entirely well. The latter class of patients are certainly far from being as promising for the benefits of an ocean voyage as the former. To these patients, as a final resort, comes the advantages resulting from the Nauheim treatment abroad, or at home. I have regarded and continue to believe that some patients—many perhaps—properly selected, get great and enduring benefit from this treatment wisely ordered. I certainly believe that there are cases of cardiac dilatation following influenza, and which show a disposition to recur and become very threatening, where Nauheim treatment has been most beneficial, and in such I would now endorse it. There may be, and are, instances in which neither the ocean nor the subsequent Nauheim treatment can be taken by reason of considerations of time and money. In such instances I should be inclined to-day, in view of what I have observed and know myself and because of observations

of other competent, reliable clinicians, to endorse the artificial Nauheim baths and resistant movements in the management of these cases when careful, judicious medical advice can be secured. But this, in my judgment, is a *sine quâ non*, and I say this because I believe I have seen injudicious treatment even at the spa itself be productive of anything but what I considered desirable results. If after a few days of the bath treatment the patient was not improved, better was it to return for a while to treatment by complete rest. The after-cure treatment of Nauheim, which consists in patients being sent to the Black Forest or some portion of Switzerland, is very important. Here it would be advisable to send patients for a while, if in summer, to the Adirondacks, Catskills or White Mountains, always bearing in mind that a moderate elevation should at first be selected to avoid possible heart strain. Dr. James M. Anders, of Philadelphia, is not convinced that the home treatment of Nauheim may be carried forward with much success for lack of a heart specialist, and daily care and watching by such an one.[7]

In some of these cases of dilated left ventricle following influenza, where the heart continues rapid and irregular and the arterial tension remains low, a prolonged course of moderate, or even small doses of digitalis is undoubtedly useful, and, I may say, curative. As Dr. Lees[8] has shown, in hearts merely weak, digitalis is of little value, but where we have concomitant dilatation it is often most helpful and preservative.

From experiments upon animals where the spinal cord or the vagi have been cut, it would appear to be shown that in warm-blooded animals digitalis acts efficiently through the nervous system, and not entirely and directly upon the muscular fibre of the heart.

In a late number of the *American Journal of the Medical Sciences*[9] I tried to show how frequently dilatation of the heart

was a sequence of lowered nerve tone. The examples there recorded were taken from cases which had developed slowly and after a long period of various morbid symptoms. There are other examples, however, where the nervous breakdown comes suddenly or rapidly, and the heart is the organ apparently most affected, or, at all events, the one which occasions the larger number of distressing symptoms. From one day to another some of these patients become conscious they have a heart, by reason of palpitations and a feeling of weakness and inability to do their usual work, which they explain to themselves with much difficulty. It is true for the careful physician the history of their life seemingly gives the efficient cause of their debility and cardiac distress. Frequently it has been the result of long-continued mental work of a severe character, to which there has rarely been even a temporary cessation. Again, it has been the immediate result of some great and sudden affliction, or of collapsed business ventures after a short and losing fight to combat relative poverty and obscurity, and, alas, at times, greatly diminished prestige and honourable repute among one's fellows. Occasionally it has been a statement of an unwise or ignorant physician, who, by an affirmation in regard to the patient's heart, has occasioned nervous dread and apprehension for which there was primarily no real cause. I have known an insignificant and temporary systolic or diastolic murmur, revealed to a physician by merest accident, or in an examination for life assurance, when told to the patient, bring all the phenomena which we could fairly assign to slight or more advanced cardiac dilatation. When, in such cases, absolute confidence of the patient is secured, and, little by little, all fears banished, the remedial effects upon heart action, force and size have seemed to me evident and remarkable. Of course, in such instances, and, so far as possible, rest, control of habits and exercise, suitable dietary,

an occasional dose of ammonia and lavender and very moderate doses of strychnine, with pepsin and bismuth, have also been employed; and, it might be urged, that in all these agencies should be found what was curative quite as much as in the mere allaying of nervous apprehension. However that may be, of one thing I am absolutely confident from repeated and long-continued observation, and it is that unless these cases are dealt with by some one who has an honest and earnest conviction as to what the real cause is of rapid cardiac failure and how it can be remedied, other means are of little or no avail. Indeed, some of those frequently employed are distinctly injurious and serve merely to accentuate and increase the physical disablement. To whip up this over-tired muscle, where nervous control is primarily lacking, and where, perhaps, degeneration of the vagi or cardiac ganglia may be in an incipient stage, with repeated large doses of digitalis, or of caffeine, seems to me highly reprehensible and injurious to the patient. I am not sure either that a Nauheim treatment is at all adapted to it at first, no matter how intelligently employed. We should wait at least a few weeks and see what rest and freedom from apprehension will first accomplish, and afterwards, no doubt, the carbonic baths, and regulated, very mild resistant movements may, in many patients, be of much value. Always, however, we should bear in mind the limitations already referred to.

A cause of frequent aggravation of sudden, minor cases of cardiac dilatation may be found in the foolish and pernicious use of the coal tar products. Phenacetin, antipyrin, and above all, antifebrin, do untold harm. We are all familiar with many pernicious so-called head-ache powders. I have known what I have regarded as evident rapid cardiac dilatation, with cyanosis, dyspnœa, palpitations, weak, irregular pulse, thus occasioned, and it has required all my intelligence,

with the immediate use of friction to the extremities, rest in bed, heat to the præcordia, oxygen inhalations, ammonia and strophanthus, to restore these patients from a condition of fatal imminence.

The public latterly, because of the columns of the daily press, which has shown, by appeal to health board statistics, the rapid rise in the number of deaths due to heart disease, has become anxious to trace out the causative influences and conditions. I have endeavoured to give some, and to show how we should regard such cases. To speak of paralysis of the heart, or of sudden heart failure, is, to say the least, unsatisfactory to the well-ordered medical mind. I believe it is also becoming very true of the layman or laywoman, and in this fact resides their commendable search after a better and more satisfactory explanation. Unquestionably the hurry, anxieties, responsibilities, worries and cares of modern life always increasing and more urgent; without doubt, late hours and little sleep, with constant noise and din of the large cities, are all causes which must be controlled or eliminated, if we may hope to prevent those many nervous breakdowns which are largely manifested by signs and symptoms of acute cardiac inadequacy depending upon dilatation. And still there are other factors to be studied and remedied. Among these we should cite the habit of too much eating and drinking, too rapid meals, meals improperly cooked and selected. Digestive difficulties, or almost sudden arrest of digestion, are brought about by stoppage of functional powers of the stomach due to strain, nervous exhaustion, supplemented or preceded by these other evident causes. How often do we see accounts of death from so-called "acute indigestion?" What does this mean? Sometimes the meal has been too abundant, too rich in varied foods with composite-sauces, backed up with various wines, and no doubt what follows partakes, in a measure, of the exhaustion which

has already touched the heart. The stomach dilates and fills with gas, due to unhealthy fermentations or development of ptomaines when the food is tainted or spoiled. Here, then, through mechanical pressure on the one hand and absorption of digestive poisons on the other, are efficient causes for great and rapid weakening of a heart muscle which is already relaxed and under tone through previous causes at work. If the stomach empty itself spontaneously, or if the effort of vomiting be artificially produced, it will occasionally very greatly relieve an imminent condition. When this does not naturally occur, or the heart is so weak and fluttering that we dread to bring it about, we must depend at first upon revivifying agents like atropine, nitro-glycerine, and strophanthus, which will enable the weak heart to regain at least partial control once more of its functions. Sometimes we utterly fail, and death may indeed occur before we have reached the patient and begun our active efforts in behalf of human life. In many such instances there may already be present evidences of previous arterial changes and organic heart disease; still, it is very clear, from the account we obtain of the history of the patient from himself or friends, that, previous to the occurrence described, he had always enjoyed thoroughly good health, so far as he knew. At all events, he had never suffered at all from symptoms of heart disease. It is the sudden or rapid dilatation of the heart which causes the death, and not the chronic condition revealed at the autopsy. This he might very well have carried for months and years without suffering, and indeed without knowledge of it unless informed of its presence accidentally, as it were. The great difficulty—almost insuperable—is to declare certainly and positively at the autopsy what physically in the heart has been brought about within a few brief hours, or days, previous to death, and what belongs altogether to lesions of an older date.

Just as I have directed attention to the fatal effects at times of injudicious over-eating and drinking, in like manner I would emphasise the extreme fallacy of persons near or past middle life running to catch trains, going upstairs rapidly, playing active tennis, lifting heavy persons or weights beyond their powers, and thus occasioning heart-strain. The acute dilatation of the heart may be accomplished in a few minutes. It may occasion immediate death, or future invalidism only, which is never entirely recovered from. The old saying that a man is as old as his arteries is doubtless true, but physiologically we cannot gauge accurately in every case arterial changes. We do know, however, that doing certain things involves great risks to the city man of many cares and responsibilities, who has had no previous daily healthful training which would enable him to resist successfully sudden or prolonged physical effort. Sudden strain of short duration is frequently very injurious and at times fatal. When excessive and more prolonged, the attendant risks of more marked and irremediable acute heart dilatation are in the aggregate more considerable. What is true, and of great moment to almost every man and woman of middle life—and absolutely prohibitive with greatly advanced years—should also be borne in mind, and guide us as regards rational advice to give young men and girls. I have seen at least once a young man of slight build, who was in the contest of a running match, and who suddenly collapsed from so-called heart-failure. He had been in fairly good previous training, but the pace and distance were finally too much for him, and he dropped in his tracks. I cared for him until his heart got back some strength and resumed its functions sufficiently for him to sit up, and he was carried to his home. Such a case is one of acute heart dilatation. I have been called to a ball-room where a young woman, after dancing and late hours for several successive nights,

drops exhausted and panting on the floor, and is carried to the bedroom. Here, through stimulants, mustard locally, ammonia to the nostrils, dorsal decubitus, loosening and removal of corsets and all constriction from petticoats, garters, slippers, &c., there was slow recovery, and the attack of syncope was dissipated. Such faint turns must, in my judgment, usually be translated simply by calling them attacks of acute cardiac dilatation. The instances all hospital physicians are familiar with are those in which, after a drunken bout or a day of excessive strain, or heavy lifting on the part of truckman or longshoreman, where also there is a history of repeated daily drinks of whisky, the patient has labouring, rapid, stertorous breathing, cold, cyanosed nose, lips and fingers, clammy frontal perspiration, frequent, almost imperceptible, pulse, and moist mucous râles all over the chest, showing acute pulmonary œdema. At the same time we find notable cardiac dilatation, and especially of the right heart, with distended, throbbing jugulars, pronounced epigastric pulsation, and diffuse, feeble, irregular and intermittent cardiac impulse. In these cases, immediate venesection followed by nitroglycerine by the mouth, $\frac{1}{100}$ gr. every half hour for a while, and hypodermics of atropine $\frac{1}{60}$ gr. three or four times in twenty-four hours, and repeated dry cups all over the chest, followed by oxygen inhalations, will alone save life many, many times.

"Among these cases, however, are unquestionably some in which the physical signs of cardiac dilatation are impossible to determine accurately. I can well understand that their existence should be denied. In place of such a diagnosis I cannot but substitute one of loss of nerve power, either in the intracardiac ganglia, or in the trunk of the vagi. To admit this would be perhaps also to acknowledge that the heart muscle was intact and the cavities of normal dimensions. Such a belief would be strengthened by those

instances in which certain cardiac tonics, and especially digitalis, are of little apparent value, perhaps, indeed, directly injurious, and rest in bed and suitable liquid diet, with alcoholic stimulants, appear to be most useful." [10]

The acute dilatation due merely to the use of tobacco, when excessive and long-continued is, I believe, often recognisable, although not as readily detected as in the other instances already described. The tobacco heart is often a cause of very great distress to the patient, on account of heart flutterings, throbbings, irregular pulsations coming on at times when the patient is in absolute repose, and making sleep well-nigh impossible. Such patients become specially self-centred, timorous, fearful and anxious. Whatever else is done, tobacco must be given up, and if indulged in at all, must be taken in mildest form and most moderate quantity. Usually, however, it is best to give it up entirely for several months, or until complete re-establishment of health has taken place. This will almost certainly take place ultimately, provided no organic heart disease already exists in advanced form.

In many cases of acute dilatation of the heart it may be difficult to pronounce absolutely that it exists, because of the presence of pleural effusion, pulmonary consolidation or emphysema. In these cases we are often led into error, either to believe that more dilatation is present than really exists, or, on the other hand, to deny its existence when after-events surely prove it to be there. There is no question that light, accurate and very careful percussion with a single finger, so well emphasised by Lees, is the surest way to avoid serious mistakes. Deep percussion, with too vigorous action and several fingers, or by means of hammer and pleximeter, will often bring out resonance from other organs and conceal the correct and accurate limitations of the

cardiac margins, and hence the size of ventricles and auricles, and, indeed, of the entire heart.*

It was stated authoritatively that during one week of last June 125 deaths occurred from heart disease in New York city. Further, it was affirmed that the percentage of deaths from this cause had notably increased during the past few years. The proportion, indeed, had risen from 18 in 10,000 in 1880 to 30 in 1904. This steady increase of mortality may well cause reflection. In some cases death came very suddenly; in others, after a term of confirmed invalidism. No doubt in many instances of both kinds the fatal occurrence would have been indefinitely postponed, if rest and relaxation from the cares of business had been taken sooner. Unfortunately, the realisation of this often comes too late, when the calamity has occurred. Much of this lamentable outcome could be avoided if men in important positions would consider their vital energies as carefully as their various daily occupations. If short vacations were taken from time to time, there would be far less need of those long absences from affairs so as to recuperate. It is only too true that what in disease has taken a long while to develop, requires an equally long time to get back one's original health and strength.

One great difficulty in estimating the risk of an ultimate break-down proceeds from the fact of the insidious march of the physical changes which produce the disastrous results. Too often indelible marks of continued work and effort are left before a prolonged and proper vacation is taken, and then it is too late to reap much benefit from it. This holds good of the vacation of travel or a change to the woods,

* "The size of the heart is the best, though not the absolute criterion, as to its functional capacity. This can be determined only by the aid of Röntgen rays, an orthodiagram being a mathematically exact tracing" (*New York Med. Journ.*, April 21, 1906, p. 837).

an ocean voyage or a cure at some well-known spa. The moral of all this is to take work reasonably and quietly, and it means happiness and prosperity ; take it in a contrary way, and it means disease and death. The plea is for more time to eat and sleep ; less hurry and worry ; readiness to take needed rest when weary ; more satisfaction in slower and surer gains, and the abandonment of the attempt to attain the impossible. Let us take time to apply the lesson of 125 deaths in one week in New York city to ourselves (vide *New York Herald*, Editorial, June 14, 1905).

REFERENCES.

[1] "Acute Visceral Inflammations," London, 1904, p. 296.
[2] *Am. Journ. Med. Sci.*, 1890, p. 397, and *Med. News*, Dec. 16, 1899.
[3] WELCH and SCHAMBERG. "Acute Contagious Diseases," Lea Bros., 1905, pp. 640-641.
[4] *Med. News*, Jan. 9, 1904, p. 68.
[5] *Lancet*, April 9, 1904.
[6] WHITE and SMITH. "Heart Complications in Diphtheria," *Bost. Med. and Surg. Journ.*, p. 423, Oct. 20, 1904.
[7] *New York Med. Journ.*, Dec. 3, 1904, p. 1099-1109.
[8] n. p. "Acute Visceral Inflammations."
[9] June, 1905.
[10] BEVERLEY ROBINSON, M.D. "Essays on Clinical Medicine," 1903, p. 86.

DISCUSSION.

Dr. R. H. BABCOCK (Chicago) : The paper is so very rich and suggestive in themes for discussion, I hardly know what to say. I would like to refer to these large doses of salicylate of sodium in acute rheumatism. From our modern conception of the etiology of this disease, these large doses are not indicated. I cannot persuade myself that salicylate is of service after the pain is allayed. In my hospital service I never continue it after the pain has disappeared. I use alkalis in conjunction with the salicylates. Where the alkali is combined with the salicylate, we allay the pain more quickly and can get along with smaller doses of salicylate. I

have seen some objectionable symptoms produced. With reference to the dilating ability of the heart one cannot fail to be impressed with the early appearance of cardiac dilatation in acute rheumatism, and I have believed for a considerable time that cases which were formerly reported as cured cases were merely cases of dilatation; then as the disease passes and the heart comes down and the murmur disappears, it has been put down as an endocardial murmur. That is wrong. I am always impressed with cardiac dilatation in children with rheumatism, and in many a case of dilated left heart with mitral regurgitation the leak can be reduced by treatment calculated to reduce the dilatation. I treated a boy who had had an attack of rheumatic endocarditis. The first sound was completely obliterated by the murmur. Nauheim baths were given and the left ventricle was reduced and the first tone at the apex returned. The freedom of his leak was not so much due to the injury of the valves as to the dilatation which had persisted.

Dr. J. H. PRATT (Boston): In answer to Dr. Robinson's question I may state that we have used the orthodiagraph for the past two years at the Massachussetts General Hospital. Possibly our apparatus was the first to be imported. The orthodiagraph was invented by Professor Moritz. It is of simple construction but expensive. Our apparatus was made in Munich, and the cost, including tariff and transportation charges was nearly $200.00.

The ordinary fluoroscopic examination gives a shadow larger than the heart. The orthodiagraph employs only parallel rays of light, and hence the shadow thrown on the screen is the actual size of the object and not an enlargement of it. With the aid of the orthodiagraph the true size of the heart can be determined by radioscopy. This is the claim of Moritz, and it is probably correct although recently disputed by Guttmann. A paper by Moritz on this subject appeared in the last number of the *Zeitschrift für klinische Medizin*. Important studies with the orthodiagraph have been made by Moritz, de la Camp, Hoffmann, Levy-Dorn and Dietlen.

The orthodiagraph is of aid in acquiring skill in cardiac percussion. My observations have shown that the area of absolute cardiac dulness is usually a more trustworthy index of the size of the heart than the area of relative cardiac dulness.

Dr. JUDSON DALAND (Philadelphia): I am interested in the paper, but I feel a difference on one point—the accurate clinical difference between right and left ventricular dilatation. Most physicians are inclined to ascribe the small feeble pulse in right ventricular dilatation to weakness of the left heart, and in cases of pneumonia they maintain that as we have this feeble pulse, it is unwise to attempt a venesection. I am, however, convinced that in many instances venesection is withheld from this erroneous observation, and the author's remarks are, therefore, valuable, and should be given wide publicity. I have observed the radial pulse to increase in force and volume during venesection. It seems to me that so far as venesection is concerned in pneumonia, where we have a serious right ventricular dilatation, there is

an urgent necessity for venesection. It is practised too little in these cases, and not infrequently we have a pneumonia death that should be written down as a cardiac death. I feel with Dr. Curtin that venesection is far superior to leeching unless you put on enough wet cups or leeches. The nervous shock Dr. Robinson speaks of in his paper can be obviated. The point in relation to cardiac thrombosis is important. The appearance of the clot *post mortem* is accountable for many deaths in pneumonia. After venesection I rely on the free use of an alkaline water, as this will diminish the coagulability of the blood constitutents, and if we can get this change in the blood mass, we lessen its liability to occur. All of us recall the distended vena cava and the right ventricle, and it is made more marked by the currant-jelly clot which exudes.

Dr. J. M. TAYLOR (Philadelphia): I am surprised that Dr. Babcock speaks so temperately of the salicylates. I have been led to fear the salicylates, and more and more the continued use of them. Personally I find that benzoate of soda is much more satisfactory. *A propos* of the remarks of Dr. Robinson on heart clot, at the discussion which took place in New York, I pointed out then and can verify now, and that is by the maintenance of the alkalinity of the blood, hence good oxygenation, we secure relief from the effects of toxins on the heart muscle, the resultant flaccidity of the protoplasm. When we consider that in pneumonia of an adult at least half an ounce of sodium chloride is daily lost, why not give this freely and internally? For a long time in my service at the Children's Hospital, I have been using internally the ordinary normal salt solution as a drink, to supply the loss of plasmatic salines which occur in pneumonia and other febrile conditions. This supply is necessary for the maintenance of the oxygenating power and the alkalinity of the blood. It is valuable as a practical measure, and it is easily administered. The children do not object to it, and are thereby kept up to their normal supply of sodium chloride. This measure maintains the plasmatic alkalinity, reinforces the auto-protective forces, and is the equivalent of an ideal antitoxin. In rheumatism it has a special function.

Dr. B. ROBINSON (New York): I want to thank the gentlemen for discussing the paper. I suppose that we, the older men, have disadvantages and advantages. Our disadvantages consist in not having all the enthusiasm and convictions of youth. We have lived a long while and heard a good many things talked about. We cannot always carry our points. I have for a long time believed that we did not counter-irritate over the heart as we should. On the other hand, it doesn't do any good if it is done in a non-intelligent way. If we repeat fly blisters over the heart and carry them to redness and some slight blistering, they are useful. I believe Lees is correct in his theories, which I have referred to.

THE TACHYCARDIA OF EARLY PULMONARY TUBERCULOSIS.

BY DR. WILLIAM M. GIBSON.

UTICA, NEW YORK.

In all of our treatises on pulmonary tuberculosis acceleration of heart action is mentioned as the chief cardio-vascular symptom of this disease. It is a noticeable clinical feature in the earliest stages of acute and chronic phthisis, appearing even before respiration is markedly disturbed, and often before recognisable changes have manifested themselves in lung tissue. We find, too, this increase in pulse rate in that peculiar disturbance of general nutrition known as the inherited tuberculous diathesis, and also in the incipient stages of an acquired phthisis. Life insurance companies have long appreciated the importance of this symptom, and have rejected many an applicant, or limited the amount and time of indemnity, for the sole reason that a slight but persistent rise in pulse rate is a frequent forerunner of tuberculous disease of the lungs.

I should feel that an apology is due to the members of this Society for taxing their time and patience with so commonplace a subject, were it not for the fact that most of our textbooks pay but slight attention to this symptom, and very generally ignore an associated disturbance of heart action—positive cardiac over-activity—which, when present, is of greater significance than acceleration of pulse alone. This form of tachycardia, while not so violent as that observed in Graves'

disease, or in some abdominal infections, is, I feel, worthy of careful study and of recognition in the treatment of pulmonary tuberculosis. In addition to increased frequency of pulse rate, we also find the heart muscle evidently labouring under undue stimulation, and although the cardiac rhythm is seldom disturbed, or the area increased, the impulse is abnormally forcible and the sounds much intensified. It is especially noticeable in young subjects, in acute and highly febrile infections, and also in cases of acute infection engrafted on chronic bronchitis, asthma and emphysema. We meet with this cardiac over-activity very early in the course of the disease, and find it a pronounced symptom well on into the stages when septic infection becomes a complication. It may cease temporarily with the occurrence of a hæmorrhage ; with recurring hæmorrhages the element of violent cardiac action generally disappears, although there may be very marked increase in rapidity of heart action. Cornet calls attention to the fact that this form of tachycardia may amount to actual delirium cordis, and that great anxiety, loss of sleep, extreme dyspnœa and other circulatory disturbances are frequent accompaniments. We also find that while emotion and mental or physical exertion increase the violence and rapidity of heart action, rest and sleep do not bring complete relief. The pulse, as a rule, is soft even during periods of extreme cardiac over-action, the blood pressure lower than normal, the systemic circulation retarded with resulting congestion of liver, kidneys and digestive tract. Cyanosis and asthmatic dyspnœa are noticed when the right ventricle becomes dilated under the severe strain thrown on it by pulmonary engorgement. These cases have been referred to me more than once as cases of functional or organic diseases of the heart. In each instance the pulmonary lesion was slight and the tachycardia pronounced enough to be the most prominent symptom.

We might naturally expect a considerable degree of cardiac

hypertrophy to result from this laboured heart action, but the tendency seems to be in these cases, as in other tuberculous affections, to atrophy and fatty degeneration, the toxic anæmia and steady shrinkage of the volume of the blood current preventing compensatory growth.

The cause of this form of tachycardia is probably complex, and there may be in the individual an element which exerts much influence in disturbing vascular stability in addition to the influences produced by the infecting organism. Fever undoubtedly causes acceleration of heart action, but in many of our cases the rise of temperature is hardly sufficient to seriously disturb it, and frequently a rapid pulse and laboured heart action have been observed in afebrile states of pulmonary tuberculosis. The toxins formed in the tuberculous growth are known to have a powerful action on heart muscle and on the nerve centres governing the vascular mechanism ; tuberculin unquestionably causes dilatation of the blood-vessels and lowers blood pressure. Obliteration of respiratory surface by new tissue formation, infective granulomata, may also disturb the ratio of lung and heart action by compelling compensatory respiratory movements. Compression of the vagus by tuberculous tracheal and bronchial glands produces an extreme tachycardia with exceedingly grave and rapidly fatal symptoms. Cornet cites the observations of a number of clinicians who have reported these morbid conditions. The individual element in our cases of tachycardia complicating the early stages of pulmonary phthisis may be a perversion of internal respiration. Both pulmonary and ultimate tissue respiratory processes are in exceedingly intimate relationship with each other, and also with the nerve centres governing the action of the heart and blood-vessels. Neither of the respiratory processes are independent mechanical operations ; both are dependent on the presence and action of certain catalytic bodies called enzymes. We know, too, that enzyme processes

are reversible, that carbon dioxide can be produced in tissues without the presence of free oxygen, and that lack of oxygen interferes with reversible colloid movements, the essential vital motion of protoplasm. Loeb has shown that even a slight disturbance of respiration very quickly affects the cardiac and respiratory ganglia. We find, too, in spite of the excessive oxygenation in the early stages of phthisis a diminution of nitrogen excretion and a great increase in phosphatic waste. Hence, if in certain individuals profound disturbance of internal respiration accompany the earliest morbid changes in lung tissue, this perverted function may act as an exciter of cardiac action ; in other words, the heart may be called on to increase the oxygen supply of tissues, oxygen starved by reversed enzyme action. We might refer here to the tachycardia observed in acetonemia of the pernicious vomiting of pregnancy, a condition in which an extreme autolysis results from interference with normal oxygenation although there is no lack of oxygen. If oxygen or an excess of oxygen is constantly offered to tissues in which the peroxides and oxydases are performing perverted functions, we must necessarily have produced an autolysis which very seriously disturbs the cardio-vascular mechanism.

A few words as to the recognition of this rapid and violent cardiac action in the treatment of pulmonary tuberculosis. Fortunately the conditions just considered are met with in a limited number of cases, but when they are present it seems to me that they are more urgent reasons for advising absolute rest than fever or dyspnœa. Heart weakness is one of the most serious results of tuberculous infection, and heart exhaustion is its chief cause of death. We still have to contend with the ancient bug-bear that sick people lose strength by remaining in bed, but there is no other substitute for complete mental and physical rest that can bring to these patients any hope of relief from this cardio-vascular derangement.

Rest in bed in a well-aired room, proper attention paid to nutrition and excretion, and the presence of a competent attendant, will do much towards restoring heart action to a more normal condition. However, in a certain number of our cases the tachycardia will be persistent, and we may be compelled to support heart action by certain cardiac tonics. I have found that nux vomica associated with full doses of hypophosphites has a most favourable effect in steadying the disturbed circulation and also in improving general nutrition. In rapidly fatal acute infections opium in the form of the old-fashioned Heims-Niemeyer pill will probably give more relief and insure more comfort than any other drug, but it should be withheld until the possibility of arresting the progress of the infection ceases to be worthy of consideration.

DISCUSSION.

Dr. F. M. Pottenger (Los Angeles): The cause of tachycardia in tuberculosis is one that interests me. I have always looked upon it as being toxic, and my experience with tuberculosis makes me think that this is true. Oftentimes in administering tuberculin, if we keep a careful record of pulse and temperature, we will find that a reaction will show in the rise of the pulse rate, while the temperature curve remains unaffected. If the tachycardia in early tuberculosis, however, is toxic, why should it be constant, while the elevation of the pulse rate which is obtained by reaction following the use of tuberculin, usually lasts only a few hours?

Dr. E. R. Baldwin (Saranac Lake): In regard to toxin action, it is well known that the essential poison of the tubercle bacilli has a special affinity for the blood-vessels or their controlling mechanism. The fact that tachycardia occurs often in cases where there are very few physical signs has long been regarded as an evidence of miliary tuberculosis. The destruction of the tubercle bacilli in the blood may be the real cause of the tachycardia. I am speaking of it from a narrow laboratory standpoint, realising that other factors play a part. From recent studies it appears that the destruction of the bacilli is produced by an enzyme action, and the essential poison of the bacilli being set free, has some unknown affinity to the vessel walls and nervous tissues, probably the sympathetic system. The subject at present is of great interest in connection with immunity studies.

Dr. J. H. Pryor (Buffalo): The occurence of tachycardia in advanced

cases of tuberculosis when marked toxæmia is present is one thing, and its appearance in early cases is quite another. Are we not inclined to attribute too much importance to tachycardia as an early distinctive sign of tuberculosis. Other causes should be eliminated, and we must distinguish between a rapid pulse and true tachycardia. The incipient consumptive may be a neurasthenic and suffer from gastro-intestinal disturbances. Certainly true tachycardia is a rare manifestation in beginning tuberculosis.

Dr. R. H. Babcock (Chicago): I question whether the tachycardia could not be secondary to low pressure present in these cases. Could not these toxins act primarily on the blood pressure?

Dr. W. M. Gibson (Utica): I desire to call attention to the fact that I stated in my paper that the cause of this form of tachycardia is probably complex, and that tuberculin unquestionably causes dilatation of the blood-vessels and lowers blood pressure. It has always seemed to me that two urinary findings, the absence of chlorides in pneumonia and the phosphaturia of tuberculosis, might give us some insight into the nutritive changes of these diseases. I regard the phosphaturia and diminution in nitrogen excretion of early tuberculosis as evidences of perverted enzyme action, especially of oxidation. The autolysis resulting must necessarily disturb cardiac action to the extent of increasing rapidity, and in some cases producing cardiac over-activity.

HEART BLOCK—CASE AND AUTOPSY.

BY GLENTWORTH R. BUTLER, M.D.
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THE clinical syndrome known as Stokes-Adams disease, has been recognised since its first description by Adams in 1827. It is only within recent years, however, that an increased knowledge of cardiac physiology and pathology has enabled an intelligent conception of its cause, and a reasonably sufficing explanation of its symptoms.

In 1893, Wm. His, Jr., demonstrated that the muscular tissue of the auricles was connected with that of the ventricles by means of a narrow strip of muscle measuring 18 mm. long, 2·5 mm. wide, and 1·5 mm. thick. This slender bundle lies in the auriculo-ventricular septum at the base of the mesial leaflet of the tricuspid valve, beginning in the inter-auricular septum, and terminating in the interventricular septum just below the root of the aorta. The discovery of this apparently insignificant band of muscle, and the convincing experimental evidence of its important function have been the cause of a marked change in the prevailing views of the mechanism of cardiac action.

The physiology of to-day teaches that the impulses to the contraction of the heart muscle have their origin at the venous end of the organ, the auricles contracting first, and are propagated or transmitted through the muscular tissue of the auricles and ventricles, and not by way of any nervous connections. Such stimuli travelling from auricles to ventri-

cles must, for lack of any other pathway, pass *viâ* the auriculo-ventricular bundle of His. Consequently this slender band of muscle bears an important part in the cycle of cardiac activity. The *rôle* played by the cardiac ganglia in the neighbourhood of the large venous openings of the heart is not yet definitely settled. It is doubtful whether they themselves can originate impulses, but they seem quite capable of transmitting stimuli to the heart muscle, and thereby putting into action the power of rhythmic contraction possessed by the latter when an impulse has been given.

The most satisfactory experimental evidence regarding the transmission of impulses by way of the auriculo-ventricular bundle of His has been contributed by Erlanger, of Johns Hopkins University. By means of a specially devised instrument, and working on the unopened heart of a dog, Erlanger is able to compress, with varying degrees of force, this muscular connection between the auricles and ventricles. With a certain degree of constriction the strength of the impulse passing from the auricles to the ventricles is reduced to such an extent, that while the auricles continue to contract at their normal rate, the ventricles, lacking their full normal stimulus, will contract but once while the auricles are contracting twice, a two to one rhythm. Thus every second auricular systole fails to be followed by the normal systole of the ventricles, constituting partial heart block. A gradual increase in the compression exerted upon the auriculo-ventricular bundle interferes more and more with the passage of the stimulus or wave of contraction, so that the rhythm may proceed from 2 to 1, through 3 to 1, and 4 to 1, up to the point where all impulses are arrested and the ventricles contract quite independently of the auricles, constituting complete heart block. The ventricular systoles which occur after a total severance of communication are due to the inherent rhythmic contractility of the ventricles.

Erlanger suggests[1] the following theory of heart block. Premising by the statement that the irritability of the ventricles in partial and complete heart block is not reduced, but is rather increased, over that which is normal, he says :—

"Clamping the auriculo-ventricular bundle reduces the efficiency of the cardiac impulses that reach the ventricles. With a certain degree of pressure the impulses become subminimal with respect to the irritability of the ventricles. Such an impulse would therefore fail to elicit a contraction of the ventricles. The next following auricular impulse would be no stronger than the preceding one, but in the interval the irritability of the ventricles has increased to the extent that the weakened auricular impulse now acts as an efficient stimulus. In this state of affairs the rhythm would be 2·1. A further reduction in the efficiency of the auricular impulse would give higher degrees of partial block, and finally complete block."

The facts and theories thus summarily rehearsed serve to explain very exactly the manifestations occurring in the Stokes-Adams syndrome. The characteristic symptoms are : (1) Slow arterial pulse, 30, 20, or less, per minute ; (2) brief syncopal, apoplectiform, or epileptiform attacks ; and (3) pulsation of the veins in the neck, these pulsations occurring at more frequent intervals than the radial pulse-beat, the ratio being from 2·1 to 4·1 or more. The parallelism between the phenomena resulting from experimental constriction of the auriculo-ventricular bundle, and those occurring in Stokes-Adams disease is so close that it is quite safe to attribute the latter to an interruption of the normal communication from auricles to ventricles, either by functional weakness or organic defect.

Stengel has recently reported[2] a case of Stokes-Adams

[1] *American Medicine*, April 6, 1906, New Series, vol. i., No. I., p. 37.
[2] *American Journal of the Medical Sciences*, December, 1905.

disease, in which the autopsy showed no degenerative or sclerotic change, excepting a small patch of atheromatous character, on the base and aortic edge of the anterior mitral cusp, extending to the endocardium directly over the bundle of His. This is, so far as known, the first instance in which a limited lesion involving His's bundle alone has been found. It is well worthy of notice that Erlanger had predicted the possible occurrence of just such a lesion. Thus experimental and pathological evidence combine to establish the true nature and cause of Stokes-Adams disease.

The case which I wish to report is that of a man, aged 43. He was seen by me on two occasions through the courtesy of his physician, Dr. Joseph G. Leiter, of Brooklyn. The patient, a business man, had always been extremely temperate and regular in his mode of life, with no bad habits in eating or drinking. The family history presented nothing of interest. His personal history told of typhoid fever twenty years, and lobar pneumonia two years, previous to his last illness. Since the typhoid fever, and perhaps before it, his pulse had always been slow. During his pneumonia, Dr. Leiter never found it over 42 per minute. His final illness, which began ten days before his death, was ushered in by fever (not higher than 101°), and pains in the larger joints. The temperature and joint pains rapidly subsided, but on each of the third, fourth, and fifth days he had a brief epileptiform convulsion, and the radial pulse went down to 28. Subsequently the convulsive seizures occurred more frequently until they became almost continuous in the last day or two, and the pulse slowed down still more, varying from 14 to 20 per minute between the attacks. The seizures began with a marked pallor, the pulse dropping to six beats or less per minute, nearly twenty seconds elapsing between successive beats on one occasion. The eyes rolled up and to the right, the pupils dilated, the head turned to the right, the lips were

cyanosed, and the arms became rigid, and underwent slight clonic movements. The unconsciousness varied from partial to complete, and was always brief. Just previous to the end of the seizure the pulse began to beat a little more rapidly and much more strongly, the face flushed, and consciousness returned. Vomiting occurred with some frequency before the attacks. Toward the end the patient passed quietly away.

During my two examinations, which were made during the last three days of the illness, the auricular pulsations in the veins of the neck were plainly visible. They varied from 80 to 130 per minute, and the auriculo-ventricular pulse ratio was suggestive, not of a partial, but of a complete heart block, the ventricular systoles bearing no definite relation to those of the auricles. In contradistinction to Stengel's experience it was possible in this case to hear (with a Bowles' stethoscope) faint fluttering sounds over the third interspace to the left of the sternum, which sounds were distinctly synchronous with the visible auricular pulsations.

The autopsy, made by Dr. Raymond Clark, Assistant Pathologist to the Seney Hospital, showed, in synopsis, the following findings :—

Gross.—Hypertrophy and dilatation of the left auricle and ventricle and right auricle, and hypertrophy of the right ventricle ; moderate mitral insufficiency ; thickening at the base of the mitral cusps ; and an increase in the amount of adipose tissue in the pericardium over the right ventricle at the junction of the auricles and ventricles and along the coronary arteries.

Microscopic.—Fatty infiltration and degeneration in the walls of the right ventricle, and, to a less extent, in those of the left ventricle ; and no pathological changes in the coronary arteries. The kidneys showed an acute exudative nephritis with fatty changes ; the liver a slight interstitial hepatitis, with fatty degeneration of liver cells, and a moderate venous congestion.

Careful sectioning of the bundle of His, compared with similar sections from a normal heart, showed that the bundle was infiltrated with fat, and had undergone fatty degeneration to such an extent that it was atrophied to not more than one-fifth of its normal size. The result of the autopsy in this case, therefore, tends to confirm the later theories in regard to the nature and causation of Stokes-Adams disease.

ARTIFICIAL NAUHEIM BATHS IN CHRONIC HEART CASES.

BY PHILIP KING BROWN.

SAN FRANCISCO.

SEVERAL years' experience with artificial Nauheim baths, given to a large variety of functional and organic heart cases has developed certain facts which may be of interest, both in regard to the preparation and use of the bath, and the results on different types of cases.

With the help of R. R. Rogers, Professor of Chemistry, and formerly assistant in physiology in Cooper Medical College, S.F., an effort was made to reproduce as nearly as possible the components of Springs Nos. 7 and 12 at Nauheim. A sea-salt was obtained, rich in magnesium and potassium chlorides as impurities, and calcium chloride was secured in bulk and repacked in paper cans holding $1\frac{3}{4}$ lbs. each. These cans were previously paraffined by dipping, and the covers fastened on while the paraffin on the freshly dipped cover was still soft. This insured protection from moisture. The bicarbonate of soda and acid sodium sulphate combination was used to produce the effervescence. The latter product was obtained in various ways, by boiling Glauber salts with sulphuric acid to obtain an iron-free salt, and by reheating the waste product from the manufacture of sulphuric acid, and adding enough acid to bring it up to the required strength. It is then poured out on lead pans and broken in small bits when cool. This product has the advantage or disadvantage of containing a good deal of iron, which in alkaline solution

precipitates in a heavy rust-coloured sediment. In this form, it is a component of certain of the springs at Nauheim, but probably has no advantage, and is certainly disturbing from the point of view of cleanliness.

I was led to experiment fully with the production of the artificial bath, because of the extremely unsatisfactory productions on the market. The one with which I have had most experience is merely a soda and acid sodium sulphate bath without the chlorides. The acid cakes vary greatly in strength, and keep very poorly. The bath with soda and weak hydrochloric acid, released from small bottles, is also unsatisfactory on account of its unevenness of carbonic acid discharge. With any of the baths, the effervescence is increased by stirring the water with a long-handled wooden spoon. This is necessary, for if the same attendant gives several baths a day and keeps an arm in the water much of the time, the skin becomes much irritated from the calcium chlorides. This ingredient, the "mutter lauge" of the bath at Nauheim, is even there an addition to the water as it comes from the ground or from the receiving tank. It is a by-product of neighbouring chemical works, and is added to the baths by an attendant. It is a difficult substance to handle on account of its irritating and hygroscopic qualities, and in the artificial bath prior to Mr. Rogers' clever device of the paraffined can, it had to be brought in 10-lb. tins, specially packed for this purpose. In my experience it is a very valuable agent in prolonging the effect of the bath, and should be used in connection with the alkaline effervescing mixtures. Given these essential components of the bath, conveniently packed for use, a graded course of baths may be given with closer supervision by the doctor, and far more careful graduation than at Nauheim, and with an incomparably greater convenience to the patient. It allows a use in a wider range of heart cases, and as I have pointed out in a

paper for the Association of American Physicians, in cases where acute heart failure is likely to occur.

In this connection I wish to refer briefly to the work I had expected originally to present to you at this meeting, the use of mustard baths of graded strength and temperature in heart failure of acute infections, particularly the pneumonias of children. The greater ease with which a mustard bath can be adjusted and the similar stimulation to the skin led me to try mustard baths and packs for the relief of the heart, particularly in bad cases of pneumonia. I am not certain as yet that this bath has any disadvantage over the Nauheim in this class of cases, but as I have not enough cases to warrant conclusions I shall not report on it for another year. In the meantime it is encouraging to note that Heubner, of Berlin, has tried a similar routine treatment with success.

The cases peculiarly fitted for Nauheim treatment are cases in which the heart muscle acts insufficiently, either from dilatation, poor blood supply from anæmias, or arterio-sclerosis with changes in the muscle poisoning, acute or chronic, and notably tobacco poisoning, and fatty changes of moderate degree.

The following cases illustrate the effects of the treatment:—

Case 1.—P. K. B., aged 36, palpitation and intermission, following severe diphtheria, augmented by the use of tobacco. At the time baths were begun, tobacco had not been used for a month. The heart was, nevertheless, omitting every third or fourth beat and the rate was between 90 and 100. Blood pressure, 120 with Stanton machine. Digitalis had been tried, with the effect of steadying the heart somewhat, but its withdrawal was followed by a return of the rapid action and intermission. Two courses of Nauheim baths were given; a ten days' intermission between them. Twenty baths in each course. In the first series, resisted movements followed the baths twenty minutes. In the second series they preceded

the bath. After the first five baths the heart would frequently beat fifty or sixty times without any intermission. The rate for some hours after treatment fell 15 to 20 beats, reaching normal at the end of the fifth bath. From that time on, pulse varied from 72 to 82, being brought down sometimes to 68 after treatment. The second series of baths was carried out in order to study the effects of movements given before the baths. In this particular instance it was shown definitely that resisted movements had quite the same effect as the bath, but upon evenings that they were not followed by the bath, the effect upon the heart was not as lasting by several hours.

A year has passed since the first treatments and during that time, although smoking has been resumed in moderation the heart has never been intermittent. The second series of baths, just completed, showed a uniform rise 10 to 12 mm. in the blood pressure after the bath. The heart rate, which had never been much above 80, was improved so that it remained most of the time in the seventies.

The exhaustion after work which preceded the first baths and which had begun to show itself, was relieved.

The chart of this case was lost.

Case 2.—G. B., aged 47. History of excessive use of alcohol and tobacco, long-continued sedentary habits, obesity, unrecognised pleural effusion after pneumonia requiring subsequent operation for removal. Heart rhythm fœtal in character. Extreme pain and dyspnœa on slight exertion. Diagnosis, fatty infiltration of heart. The effect of the baths is indicated on the accompanying chart, the diagram showing the pulse before and after treatment. Resisted movements were given before the bath. Patient, a year and a half later, without further treatment, is very comfortable. On the Von Noorden anti-obesity diet he lost 40 lbs.

Case 3.—J. W. W. aged 64, suffering with advanced

myocarditis, general arterio-sclerosis, subsequently developing intermittent claudication, and finally died of general cerebro-spinal softening manifested as a progressive paralysis. Under my care he had one severe attack of tachycardia. Following this the pulse, which had been in the nineties before, ranged above 100, despite the administration of small doses of digitalis. Nitro-glycerine with it had no effect upon the pulse. The administration of even moderate doses of digitalis seemed to make the pulse worse, as indicated by the chart. The result of the Nauheim treatment is indicated in this case by the morning and evening pulse, the records of the immediate effect upon the pulse having been destroyed. The patient, who had been bed-ridden for more than two months, was sitting up in two weeks and walking in less than three. Over-doing lead to an acute return of symptoms a month later and the symptoms of softening followed rapidly. The case is presented as illustrating that even in extreme advanced myo-carditis benefit can be obtained from the baths, although in such cases they must be given with extreme care.

Case 4.—J. I. S., aged 58. Diabetes of six years' standing. General arterio-sclerosis, with heart and kidney changes. Extreme exhaustion from ordinary work. The record of the first nine treatments was lost and the subsequent record does not show as strikingly the immediate effect of the bath on the pulse, which prior to that time had been often 110 or 120. It suffices, however, to show that the effect of the bath was to bring the pulse down into the seventies, and so gratifying was the result to the patient that during the latter years of his life he took the baths himself whenever he felt overtired. The black vertical lines on the chart indicate the days or periods that the baths were omitted, and frequently on these days the patient over-exerted himself and it will be seen that on the following day the pulse was usually much higher than on the day that he received a treatment. Death in this case resulted from diabetic coma, following acute articular rheumatism.

Case 5.—Mrs. M. G., aged 66. History somewhat the same as Case 4, except for the addition of cardiac pain on any exertion. The chart here indicates the rapid effect of the bath, the progressive benefit during the ten days in bed and the sustaining of the better pulse during the period of activity that followed. This patient was seen on April 16, 1906, one year after the treatments, with a return of the pain and rapid heart action. Treatment was interrupted by the earthquake.

Case 6.—Mrs. M., aged 57. Illustrates simply the greater benefit that followed the giving of resisted movement twelve hours after the bath. The first part of the chart indicates the pulse right after the treatments, in which the movements immediately preceded the bath. The case was one of advanced myocarditis, which had been benefited six months previously by treatments similar to the first of the series indicated in this chart.

Case 7.—A. B., aged 37. Over-weight fat infiltration of cardiac muscle, dyspnœa on slight exertion, bad palpitation. Over work. The baths in this case were given to enable the patient to continue the necessary work. For two months following them, the patient was able to continue her work without the discomfort experienced before.

Case 8.—Mr. C., aged 44. Arteriosclerosis, locomotor ataxia, palpitation, extremely poor heart tones. In this case the patient was given Fränkel movements for a bad ataxia instead of resisted movements. These movements were much more taxing than resisted movements. The chart shows the effect on the pulse of the movements judiciously given. In almost every instance they lowered the pulse, which was still further lowered by the bath.

This form of treatment of locomotor ataxia I have given to a number of cases, and while the Fränkel movements need no further commending from me, I wish to add that the treatment combined with the bath has served an excellent purpose

in relieving a great many of the symptoms of this disorder. I refer particularly to the spasmodic muscular contractions, which are sometimes very painful. It seems likely that the improved circulation is responsible for the benefit.

Case 9.—J. F., aged 57. Advanced case of arteriosclerosis with extensive changes in the heart muscles and some renal changes; marked irregularity in the rate and force of pulse and frequently 20 beats in 100 not registered at the wrist. At the time I saw this patient he had been four months in bed, on all manner of heart stimulants, and had had four attacks of acute dilatation with delirium cordis. In the last of these attacks, he fell into my hands. The early record of the baths I regret I did not keep. At that time his pulse was 120 to 130 when counted with a stethoscope; about 90 at the wrist. This patient, now nearly a year later, is able to be about and to take light exercise. The heart is still extremely irregular in rate, but the muscular insufficiency is not accompanied by any subjective symptoms. In this case, as in a good many others, the baths were frequently followed by an hour or two of quiet sleep, and for the first time the patient was able to do without hypnotics. The use of opium in such cases as this I cannot commend too highly, particularly in the beginning of attacks that result from over effort of the heart.

Case 10.—Mrs. E. S. H., aged 67, was seen after a year of intermittent rest and drug treatment for paroxysmal tachycardia due to sclerosis of the aortic arch and aggravated by emotional and gastric disturbances. This patient had twenty baths, not always with the desired result, owing to indiscretions of diet and to emotional disturbances that I could not control. An attack of tachycardia, lasting twenty-four hours, enabled me to try the bath as a means of shortening it. I had given her in one previous attack digitalis and nitroglycerine, without perceptibly influencing the attack, which

lasted two days. The attack treated by the bath was shorter than the previous one, but the bath itself seemed to increase the pulse action slightly. Two things were interesting in the case: First, the doubling of the pulse in tachycardia, a fact which I also observed in one other case where the pulse raised from 70 to 140 in one attack of fifteen minutes duration and to 280 in an attack an hour or two later. The second interesting observation is that although the patient was having two or three of these attacks a month prior to the baths, she has had only one in the five months since. This I attribute largely, however, to more attention paid to the diet.

Two cases are cited to show some of the limitations of Nauheim treatments.

Case 11.—F. F., aged 38. Chronic interstitial nephritis, hydrothorax, hydropericardium, general anasarca. All internal medication without avail. The patient seemed to me slightly better for a day or two following the first movements with exercise, but despite the most judicious care in administering the treatments, and with close attention to saving his strength by lifting him in and out of the tub, no benefit whatever resulted from the treatments.

Case 12.—Mr. J., aged 58, mitral and aortic regurgitation, extreme hypertrophy. Entered the hospital for cough, due to œdema of both lungs. Baths were given on three successive days, and then a fourth one after the intermission of one day. The chart indicates the effect upon blood pressure and pulse. The patient was not in the least benefited by the baths, and died from pneumonia five days after they were discontinued.

It is impossible to cover all the points one might wish to in a recital of such cases as these, but there are several things that are quite apparent.

On one point in particular I will speak emphatically, inasmuch as the American medical press has contained several

articles recently on the subject, viz., the use of resisted movements with the Nauheim bath.

Any one may satisfy himself fully that judiciously given resisted movements lessen the pulse rate in patients without temperature, but with rapid heart action, except possibly in extremely advanced cases of interstitial myocarditis, and it may do much even in these cases. I do not think that the resisted movements are essential, and they are certainly not as lasting in their effects as is the bath. They are often very tiresome to the patient and are dangerous in bad cases unless given by a person who understands fully the purposes of them and who realises that every case is a law in itself. As a rule, in my experience, it has been best to give them an hour or two before the bath. When this is not possible, I have found it wisest to wait a number of hours after the bath.

On the subject of massage in connection with the treatments, I can only say that I have found it of advantage, particularly when the temperature of the bath was below 90°, in securing a prompt reaction from the sensation of cold which patients with sensitive skins frequently have as a result of the stimulation of the skin. It is necessary that the patient be put back into a warm bed and that the attendant should take pains to rub the extremities vigorously and even the body if there be sensation of cold.

THE INFLUENCE OF BAROMETRIC PRESSURE ON NEPHRITIS.*

BY HENRY SEWALL, PH.D., M.D.
DENVER.

We are as yet far from the possession of statistics from which can be deduced with any degree of certainty the influence of barometric pressure on the origin and course of kidney disorders.

Yet there is no subject on which the mass of the medical profession is more ready to pronounce itself with positiveness. Of the meagre literature pertaining to this field a large proportion has been contributed by members of this Association. There is a general consensus of opinion that a person afflicted with nephritis may expect to thrive best in a climate characterised by warmth and equability, which conditions involve a considerable degree of humidity, and that to be avoided are resorts which are damp, windy and whose temperature is cold and variable. Among the proscribed localities are all places of high altitude, which may be presumed to include elevations above 3,000 feet. It is doubtful whether any competent student of this subject, when he advises a patient with renal disease against resorting to a high altitude, is guided by anything more than the admirable conservatism of the practitioner, who, dealing with unknown quantities, prefers to risk a mild rather than a strong prescription.

With a fair experience in private practice at an altitude of one mile above sea level and supported by *data* collected

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* The discussion on this and succeeding papers will be found on p. 158.

during a connection of fifteen years with the staff of the Denver County Hospital, I have arrived at certain views on this subject which may be of value as a basis for further observation. There is, on the one hand, positive evidence that albumin or albumin and casts may diminish or disappear from the urine of a person as a result of descent from a high to a low altitude, and that at the same time, the attendant subjective symptoms may be ameliorated.

In a lady who was a subject of an advanced stage of arrested pulmonary tuberculosis and who developed, probably in Denver, a high degree of albuminuria, there was nearly a complete disappearance of albumin from her urine immediately on her reaching San Francisco. In Honolulu, her home, the kidneys gave no trouble for many months preceding the patient's death, which took place in about two years.

A young man, of somewhat dissipated habits, and from a gouty family, developed in Denver the signs of acute nephritis of moderate severity and the condition took a mildly chronic course. The patient returned to his home in England, where he is said to have improved at once, and in a few months entered the British Navy, presumably well.

On the other hand, probably every practitioner of large experience in high altitude resorts has accumulated abundant evidence tending to show that cases of acute nephritis subside apparently as readily there as, judged by the literature, they might be expected to do at sea level, and that cases presenting the characters of chronic nephritis may apparently recover or continue to live in comfort for years. The writer, then, assumes the position that in certain forms or conditions of nephritis residence in high altitudes is distinctly antagonistic to the welfare of the patient, but that in other qualities or phases of the disease, a low barometric pressure, at least under conditions found along the eastern slope of the Rocky Mountains, does not retard, and may possibly even favour

recovery. Such discrimination, however incompetent to resolve the perplexity of the therapeutic problem, at least makes clear in advance that no sound solution can be expected until we understand, in the first place, the physiological action of the climatic factors of high altitudes; in the second place, the etiology and pathology of the processes comprehended under the name "nephritis," and, in the third place, the effect of the modified physiologic conditions on the morbid process.

However ambitious such a scheme of research may seem, the progress of the past gives strength to the hope that a few decades, or even years, will furnish the answers to all these questions. Even now there are sufficient *data* at hand upon which to base working notions of the relations of barometric pressure to nephritis. For ten years or more it has been recognised that temperature records, registered by a column of mercury or alcohol, do not present all the facts of temperature; that is to say, there is a psychological element involved in our conception of heat and cold which is not an attribute of the physical instrument. When the thermometer reads 50° in Boston and a person feels chilled, and when at 50° in Denver the same person feels warm, are those temperatures physiologically identical? If there is an organ in the body which is affected adversely by "chill," should not that organ suffer more in Boston than in Denver? There is, then, fair reason for demanding that in distinguishing the influence of climatic factors on any diseased condition, the curve of physiological variation should be traced as carefully as that of the physical changes. It is, of course, now a matter of common knowledge that the curves of sensible and instrumental temperatures depart widely from parallelism when resorts of high and low altitude at the same latitude are compared together. The further consideration of the physiological effect of the climatic elements of diathermancy

of the air, bodily and solar radiation, &c., render this problem exceedingly complex.

We are already in possession of facts physical, physiological and pathological which, when arrayed together, give rise to conceptions which may be helpful as working hypotheses in the investigation of this subject. It must be admitted that the solid tissues, fluids and gases throughout the body are under a certain tension which exactly balances the pressure of the atmosphere upon the surface. It would seem to follow that when one enters a pneumatic chamber in which the air pressure is lowered, or ascends from a lower to a higher altitude, there would be a movement of the labile parts of the system from the interior towards the exterior. As has been said by others, it is as if the whole surface of the body, including lungs and skin, were under a great cupping glass. There would be congestion of the skin through filling of the superficial vessels, and, presumably, determination of blood to the air passages and alveoli. These, or other physical changes, are very striking when the diminution of barometric pressure is sudden; they are probably none the less inevitable, though unperceived, when the atmospheric tension is reduced slowly or to a minute degree. It must, however, be premised at the outset that no unverified deduction whatever concerning the reaction of the living mechanism to physical changes is permissible. It is familiar to all that sudden or extreme reductions in atmospheric pressure set up profound physiological disturbances, though there is a wide range of reduced tension to which the healthy body, when brought under its influence gradually, can so deftly adjust itself as to show no functional perturbation. How long a time is required to establish equilibrium between the internal tensions and the external pressures we do not know. The consensus of recent opinions seems to be that this is accomplished immediately; but even so, it is reasonable to suppose

that the vital reactions to these pressure changes are of measurable magnitude and duration. Still more are we in the dark as to the time needed for the resumption of co-ordinated physiological action under all conditions, the period of "acclimatisation," which has been disturbed by the physical change.

It is a fact which must have been familiar to the ancients that persons of a certain dyscrasia are profoundly affected in their sensations by changes in the weather. It is commonly admitted that what we call "bad weather" can frequently be predicted by some hours through the excitement of painful sensations. The most constant meteorological change involved in shifting of the weather from fair to foul is a fall in barometric pressure. Hydraulic engineers find as a constant phenomenon that caisson workers who remain for considerable periods in an atmosphere of abnormally high density, suffer severe pains in the joints and muscles *during the period of decompression*. It seems doubtful whether all such cases can be explained as the result of mechanical effects of blood gases suddenly thrown out of solution.

The class of cases thus impressed by ordinary atmospheric conditions is that forming the great group of gouty or lithæmic subjects. In view of the recent admirable expositions of Chittenden,* it would seem more correct to speak of its members as victims of a dyscrasia of "intermediary metabolism," by which is meant the perversion of the normal oxidation processes of the body, particularly in the liver, resulting in the accumulation of poisonous metabolites which cannot be turned into chemical forms which are non-toxic and easily excreted. Admitting the truth of the assumptions already made, our working hypothesis will have to consider three possible ways in which a

* Some Problems of Intermediary Metabolism. The Shattuck Lecture, 1905; also "Alcohol as Food," *Medical News*, April 22, 1905.

fall of barometric pressure may provoke painful sensations. (1) The mere mechanical redistribution of the body fluids may excite, like a movement of massage, the nerve filaments made abnormally sensitive by a chronic inflammation; (2) the accumulation on the surface of blood containing an excess of intermediary metabolites may, as in gout, cause precipitation of irritative matters in the muscles or connective tissues; (3) the circulatory changes in the metabolic organs, particularly the liver, may so interfere with their normal oxidative powers as to lead to the abnormal accumulation of the products of intermediary metabolism.

Having thus stated the general problem, I venture to offer a review of certain observations which seem to me to bear upon the subject, and which will be more fully detailed in another place.

On *a priori* grounds it might be supposed, from the known effects of reduced atmospheric pressure, that during the process of physiological adjustment the blood mass of the body would unduly revert to the veins, not only of the surface, but of the interior as well. What, if any, effect is imposed upon the distribution of blood as a result of lowered atmospheric pressure, when acclimatisation has already been secured, is a problem to be solved by observation and not by argument. I have long been impressed with the evidence of overstrain of the right side of the heart in certain cases newly arrived in Denver from lower levels, from which the conclusion is obvious that venous blood pressure is abnormally high in such cases. Indeed, Dr. Oliver* has put the matter to experimental test, and found that the venous blood pressure decidedly increased in going from London to Arosa, altitude 5,800 feet. In recent months I have made many observations on the venous blood pressure with the aid of

* "Blood and Blood Pressure," London, 1901.

the little instrument, which is here shown. Early in my work it was noticed that, aside from normal variations of venous pressure incident to change in external temperature, digestion, exercise, &c., there was manifest in a certain class of pathological cases a constant elevation of venous pressure more or less above the normal. These cases all presented symptoms which included them within the group of gouty or lithæmic subjects. As to what seems to me to be the subsequent reaction of the heart and arteries to this condition is not now a matter of inquiry.

Particularly deserving of mention in this connection are two examples from this group. One is that of a man aged 27, of full figure and florid complexion, who is afflicted with a passive though extensive process of pulmonary tuberculosis, which, however, does not interdict clerical labour His chief complaint is of frequent "colds." The urine of this patient is of high specific gravity and contains no albumin, but is loaded with hyaline and granular casts. Some months ago his urine was normal. The other case is that of a professional man of phenomenal mental and physical activity. His complaint is of repeated attacks of pain and swelling in the small joints and sheaths of tendons. I am permitted to report, from the notes of other observers, that the urine, in this case, likewise contains no albumin, but is of high specific gravity and holds great numbers of hyaline and granular casts. It is worth noting that during a recent severe attack of tonsillitis, the casts temporarily completely disappeared from the urine.

We have now reached a stage of the argument in which it may be asserted as certain or probable : (1) That diminution of barometric pressure *per se*, at least temporarily increases venous blood pressure ; (2) That elevation of venous blood pressure characterises certain disorders which may be properly embraced in the group determined by the perversion

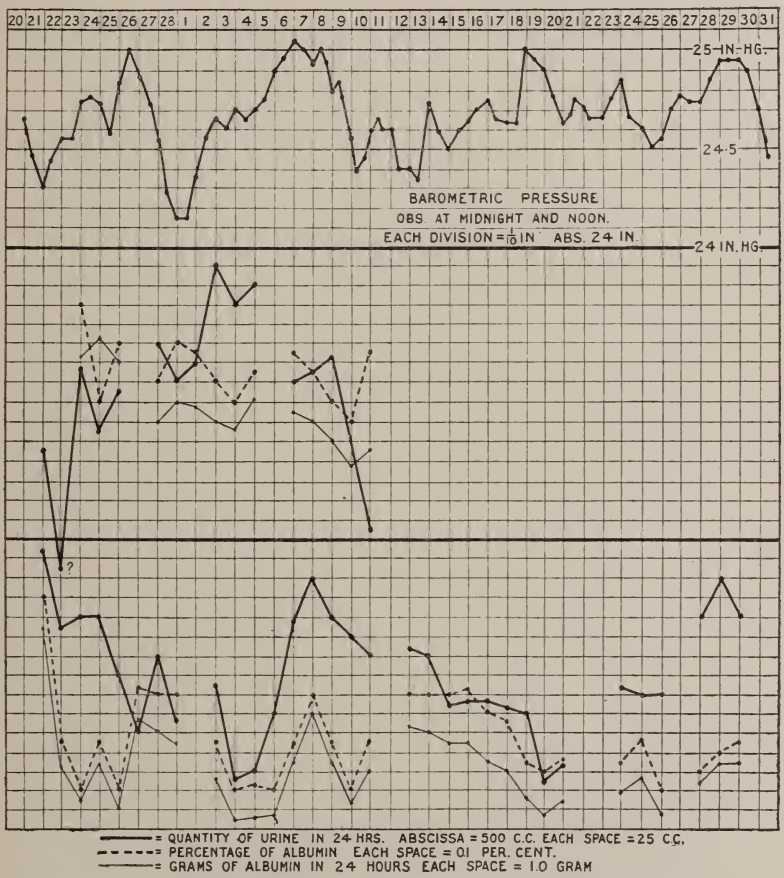
of "intermediary metabolism"; (3) Observations on the two cases last referred to suggest that the metabolites of this condition may act as specific irritants to the kidneys, particularly in view of the fact that all we know of the etiology of nephritis characterises it, broadly speaking, as the result of a toxæmia.

With these views in mind it occurred to me that useful information might be derived from the comparison of the curves of barometric pressure with those of albumin output in cases of Bright's disease. The sources of error in such observations are numerous and difficult to control, but Dr. Shuler Craft, *interne* in the Denver County Hospital, has carried out the work unaided and with careful attention to details. For the barometric data I am indebted to the genial Weather Forecaster for Denver, Mr. F. H. Brandenburg.

The estimates of albumin were made on the urines of two patients at 10 p.m., from the twenty-four hours' specimens. The estimates of albumin as to amount and percentage were made by the use of the Esbach albuminometer and fluid. One case, that of a man about 50 years old, was bedridden and believed to have chronic parenchymatous nephritis. The excretion of albumin was very large. The observations were continued from February 21 until March 11, when the patient died. The other case was that of a man aged 57, who apparently suffered from the same disorder, together with some cirrhosis of the kidney. He was up and about the ward of the hospital, and was investigated from February 21 to March 31, 1906. His excretion of albumin was only about one-tenth that of the other. As might have been expected, the results of these observations indicate the extraordinary complexity of the conditions involved.

There is, in general, a significant increase of albumin amount and percentage accompanying or preceding a fall in barometric pressure, but any deduction therefrom is contro-

verted by the fact that there is in one instance a decided increase in albumin output with the most marked rise in the barometer. The results have at least the value of calling attention to the marked fluctuation, both qualitative and



quantitative, in the urinary secretion of patients maintained under fairly uniform conditions.

In conclusion, it may be asserted that in changes from a lower to a higher altitude there is produced a modification in the distribution of the blood mass. As a somewhat similar

change in circulation probably characterises the dyscrasia giving rise to products which irritate the kidney, it is reasonable to suppose, though it does not follow as a logical sequence, that such a change of circulation may set up the morbid metabolism which brings disaster on the weakened kidney. As to the relations existing between arterial, capillary and venous blood pressures, after acclimatisation or physiological adjustment to high altitude has been secured, only appropriate investigation can disclose. There are good reasons, however, for believing that the tendency of continued residence in high altitudes is to permanently modify the circulation in the same direction as that taken by the temporary process. It must not be overlooked that a drop from a high to a low altitude may, temporarily, produce as marked disturbance of physiological functions as the reverse.

Even if it be admitted that residence in high altitudes throws additional strain upon the kidneys by reason of an increased production of irritating metabolites in the blood, the recent studies in immunity should warn us against the precipitate conclusion that residence in high altitudes tends to provoke disease of the kidneys. On the contrary, it is possible that tolerance is gradually established, or that even immunising processes are thus set up which place the renal resistance upon a higher level, and that the kidneys, like other vital organs, tend to react to strain, and, when their resilience is not overstepped, are strengthened thereby. Weichardt has found that toxines may be extracted from the muscles of fatigued animals, which produce the symptoms of fatigue when injected into the circulation of fresh animals. When the injections are repeated sufficiently often, animals become "immune" (or tolerant ?) to what would have otherwise been fatal doses.*

* Quoted from Zuntz, Loewy, &c., "Höhenklimas und Bergwanderungen," 1906.

THE RATIONAL TREATMENT OF VISCERAL PTOSES.

BY J. MADISON TAYLOR, A.M., M.D.
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In this paper are offered briefly a few facts and opinions with a *résumé* of my own experience in the treatment of the visceral ptoses. It may serve as a foreword for a later and fuller presentation of the subject.

A review of the literature tempts me to bring together significant points in primary causation and later relationships of visceral ptoses to developmental defects and their bearings upon a large array of fundamental derangements of childhood and later life. Curability depends on a true appreciation of the kind and quality of the starting points. The central defects lie in structural peculiarities of the embryo carried on through the period of infancy and childhood, aggravated by reactions due to functional derangements, and later by traumata, strains, and the unwholesome effects of what may be regarded as inevitable conditions and reactions.

Protracted exhaustive states, especially where these depend, as is usual, upon inherent weakness or developmental errors, are aggravated by functional disorders. A host of disabling maladies are either the result of these common ætiological factors or are reactionary to them. The purpose of the clinician should be to aim at perfection, not to be content with mere correction of derangements. The subject under discussion is an illustrative instance to emphasise the principle,

so often enunciated by me, that we should reach back in our efforts to the original defect, the correction of which conserves constitutional depravity from its earliest divergence, and we should amplify the inherent organic resources to the uttermost.

A study of recorded facts shows that in early life a tendency is often exhibited to various visceral ptoses. J. A. Abt (The *Journal of the American Medical Association*, April 27, 1901) cites a number of authorities (Jules Comby, Steiner, Abraham Jacobi, W. R. Stewart, Richard Frey, Senator, Glenard, Walkow and Delitzein, Ebstein and Dietl) to show that in the ætiology of movable kidneys in children we must look to a congenital origin, predisposition, emphasised later by traumata. Also that the proportion in the sexes is the same as in older persons, overwhelming in favour of girls.

Hemmeter (*International Medical Magazine*, March, 1902) claims with Rosengart, Langenhans, and Küttner to favour the congenital view of ætiology. He says Landau and Kusster deny this. His co-operation with the anatomist, Professor J. Holmes Smith, in a study of the viscera of infants, predisposes him to favour the theory of Rosengart, that enteroptosis is a pathologic reversion of the location of the abdominal organs to an embryonic state (*Zeitschrift für dietetische und physische Therapie*, i.).

Fenton B. Turck, in an article on enteroptosis (*International Medical Magazine*, March, 1902), presents a *résumé* of views on ætiology, quoting twenty-four authors, all showing the tendency to fix the primary fault upon congenital defects. Meinert (*Volkmann's Sammlungen*, Nos. 115 *et seq.*), says : "In the course of time through inheritance, deformity of the chest and visceral ptoses may become a peculiarity of the race." Stiller (*Archiv. für Verdauuskunde*, 1896, says : "The symptoms of enteroptosis are not due, in the main, to anatomical displacements of the individual." Rosengart

(*Zeitschrift für dietetische und physische Therapie*, i.), refers to the fact that the fœtal position of the abdominal viscera remains the same throughout life. Failure of these to change to the positions of the adult may be considered a cause of ptoses in most cases. Kussmaul (*Volkmann's Sammlungen*, No. 181) thinks there is no doubt but that in visceral ptoses there is a reversion back to the embryologic state, secondary not primary.

E. M. Corner (*International Clinics*, ii., 1905) has shown that herniæ in children are due to two great factors, congenital malformation and gastro-intestinal fermentation. These seem to share a common etiologic factor with the visceral ptoses.

W. B. de Garmo (*Medical Record*, February 13, 1904) states that the principal predisposing cause of hernia in infants is defective development. Harris's contention (*Transactions of the American Surgical Association*, 1901, p. 457) that the cause of movable kidney is a peculiar body form, diminution in capacity, vital depression, and a constricted outlet of zones formed above the centre of the organ, hence concentrated motor acts crowd it down by compressor action of the lower ribs, gives strength to the view that we have to do with a vitiated organism. Stumdorf (*Medical Record*, January 13, 1906) maintains that "Dislocated kidneys will invariably be found associated with characteristic skeletal stigmata; thus the possessor of a prolapsed kidney probably had club foot or has acquired flat foot, shows a tendency to or aggravation of existing herniæ, spinal curvatures, proneness to articular disorders, dislocations and fractures, uterine and ovarian displacements, and prolapse without apparent intrinsic cause."

Pathologic causes of movable kidney include factors that bring about increase in the weight of the kidney, such as sarcoma, carcinoma, hydronephrosis, a large calculus, or aneurysm of the renal artery, especially if associated with a

false renal hæmatoma, causing an unusual tugging at the not over-strong fibrous support of the kidney (Penn Gaskell Skillern, *American Medicine*, March 17, 1906). In view of the many similar testimonies to the potency of early constitutional causes it seems idle to multiply surmises as to the instrumental causes. Almost any kind and degree of trauma or functional derangement may induce visceral ptoses in one so predisposed.

All this is cited, and much more could be offered, to show that we should not fail to start at the beginning, the *fons et origo mali*, and not waste time in correcting only obvious derangements. Childhood is the time to initiate measures whenever possible. Closer observation then would prevent much after damage.

The problem in treatment is to rectify at the point of origin, to readjust the visceral displacements by repairing the central defect. After this has been done, if there then remains notable local defects, such as profound dilatation, or sagging of an organ, or supporting structure, it is time enough to interfere surgically or to employ the habitual use of mechanical supports, corsets, pads, belts, &c.

We owe gratitude to the surgeons for many important observations, efficacious procedures, life-saving operations. So heartily and frankly do we testify to this truth that they are inclined to plume themselves as being especially ordained to assume responsibility in a large, increasing part of those fields which we have felt to be rightly our own. It is true, we internists have repeatedly failed to accurately recognise, estimate, or cure, conditions which are made plain enough when the obscuring skin and overlying tissues are removed. It does not follow that we shall fail in the majority of difficult conditions because most of these are altogether beyond the scope of surgical mechanics. To be sure, it is a commendable, a practical measure, to boldly snatch away the overshadowing structures and seize the dubious portion in the

hand and, if offending, cast it away. "Mr. Punch, what would you do if the man was too long for his coffin?" "Double him up, sir." This achieves economy of space and time, but is not to be always recommended, for excellent reasons.

In the treatment of those disorders, many of them painful and disabling, resulting from loss of tone in the supporting structures of important organs, we see far more in literature nowadays of surgical procedures. Ventral-fixation of the uterus, stitching of the kidney, snipping out portions of the hollow viscera which have become prolapsed or dilated, also various devices, almost purely mechanical, to make old bottles parade as fit to contain new wine, are reported daily. Little is said of repairing these tissues, living but flaccid, asthenic from central constitutional defect and reinforcing those directly at fault. It is true, general measures are advised, tonics, rest, change of scene, even *massage* and general exercises, but not specifically or in sufficient detail. It was my privilege to have my attention directed to the ptoses a quarter century ago and the paramount efficacy of restoring the elasticity, vigour, and function of the adynamic structures of the torso. Each year has revealed better methods of accomplishing this. Those who come later will be equally or more fortunate, until it is reasonable to expect, we shall be fully able to cope with most of these problems without recourse to the knife. Unfortunately the case records of slow, steady educational treatment make monotonous reading compared with the graphic, tangible accounts of new and clever surgical procedures, illuminated by all the modern resources of illustration.

Let us bring before our consciousness the indubitable fact too often lost sight of, that all operative invasion of the abdominal parietes is a serious matter, not only directly, but remotely. It will be admitted by most surgeons themselves that it is always desirable to avoid operation if equal results can be secured by rehabilitating the inherent forces. My

opinion, based upon a long and full experience, is positive that displacements and ptoses of the viscera can, in nearly all instances, be restored. Along with this also marked increments in vigour are attained by the means employed, to say nothing of the retro-active benefits, which directly follow.

Glenard, to whom we own most for directing our attention to the ptoses, has recently (*Bulletin de l'Académie de Médecine*, Paris, lxx., Nos. 5 and 6) describes phrenoptosis or downward displacement of the diaphragm, which he shows, is responsible for cardioptosis. There is, in some, a general tendency to ptoses, of which movable heart is an episode. Enteroptosis is due to nutritional faults of hepatic origin. The same causes which induce liver affections preside over their origin. The malady, he says, is the product of five morbid groups; dyspepsias, neuropathies, liver disorders, nutritional disorders, and a fifth group which includes movable kidneys, movable liver, over-movable spleen, and uterus. He regards enteroptosis as the cause of one-third of all the dyspepsias and neuropathies in women, in whom 80 per cent. of all these conditions are found. He believes them to be readily curable if properly recognised and treated, but if not they induce much trouble. His method is to apply a sustaining corset.

H. P. Hawkins (*British Medical Journal*, January 13, 1906) calls attention to "Enterospasm and its mimicry of appendicitis." He finds pressure will sometimes relieve in slight cases. I have repeatedly demonstrated that pressure over or near the lower dorsal and upper lumbar vertebræ will promptly relieve various forms of colic, some cases so intense as to have lasted for months. The use of continued finger pressure often cures in a few days.

Delbet (*La Semaine Médicale*, Paris, xxv., No. 47) describes a number of patients complaining of disturbances in the region of the appendix in whom the trouble proved to be ptoses of the cæcum only. In them the appendix had been removed,

but the disturbances persisted. The trouble is essentially generalised paresis of the intestines.

H. A. MacCallum (*British Medical Journal*, February 18, 1905) makes some wise remarks on the treatment of the viscero-ptoses emphasising the value of systematic repair. He says : "Massage helps the patient to get control of the lower neurones and of the upper neurones."

I am struck with the elaborateness of surmises, theories, apparently logical conclusions as to many points in the literature with singularly inexact recommendations as to treatment. Particularly lacking in definiteness is the reference to the kind, quality, and amount of regulated movements and massage.

The etiologic factors, underlying the visceral ptoses, particularly dilatation and motor insufficiency, depend in large part on lessened vaso-constrictor tone. From this there follows passive congestion of the organs affected and the adjacent structures. These phenomena lead to infiltration in the structures of the organs and those concerned in their support. A loss of viscero-motor tone is thus induced, which leads to relaxation of the viscus or viscera, and this, again, is accompanied by a corresponding relaxation of the ligaments and tissues which afford normal support. For example, in gastroptosis there are nutritive derangements in that portion of the cord adjacent to the region from the fourth to the ninth dorsal vertebræ. In this region are placed the cell bodies which control the viscero-motor and vaso-constrictor activities of the stomach and its supporting structures. So also of the other viscera, according to the distribution from their viscero-motor and vaso-constrictor subsidiary centres. If these centres in the corresponding portions of the cord be insufficiently supplied with normal blood, it transpires that those cell bodies are relatively starved and become thereby incapable of performing their normal functions. This is equally true of those

tissues concerned in support, such as the abdominal muscles. These conditions of nutritive depravity lead inevitably to losses of tone in the muscular coats of the affected viscus, hence dilatation ensues. Consequent upon the loss of vaso-constrictor powers, there follows passive congestion in the coats of the visceral blood-vessels, deficient nutrition of the parenchyma of the viscus of the adjacent parts, relaxation of supporting structures, hence ptoses or dropping down of that particular organ most affected. Similarly of other organs than the stomach other centres are thus affected.

Ptoses, displacements of viscera usually downward, cut a large figure in causing or contributing to a number of ailments, not only in adults, but in the young. Along with these sometimes occur dilatations, contractions, stenoses of the same, or adjoining structures. Light is being shed on these of late, due probably more to the exact observations of surgeons in their now frequent explorations than to that of internists. Certainly many of these conditions escape attention of the physician who ought to know the symptoms, or at least keep them more fully in mind. The phenomena are, it is true, usually vague and only to be determined in connection with other data, but the real reason they escape detection is that frequent omission of thoroughness we all commit, if we fail to strip the patient and examine manually. It seems to me almost an axiom that our full duty by a patient is not discharged until we have manipulated and estimated the character and condition of the tissues, certainly of the abdominal viscera.

Among the most influential factors in aggravating the ptoses are dyspepsias, intestinal fermentations, and putrefactions. These must be modified promptly and persistently. In achieving this we can only mention measures. First in importance is to acquire the habit of chewing thoroughly, achieving a complete mastication and insalivation. The rules

of Horace Fletcher should be observed, viz., to reduce the food to a cream and permit it to be swallowed only when it can no longer be retained in the mouth; to take no fluid while food is in the mouth; to take no more food in the mouth till one bolus be disposed of. Thus, a normality of taste will be acquired and selection becomes normal, choice be unconsciously wiser, less variety will be needed, less pungent articles desired, in short, a greater simplicity and sanity of taste. Certain articles are found to ferment, *e.g.*, sugars. They are not objectionable if retained in the mouth till the action of saliva changes their chemistry. Over much proteids should be avoided. Metchnikoff demonstrates that the action of the *Bacillus lactis* neutralises putrefaction, hence clean acid milk, buttermilk, keffir, youghort, bonny clabber, &c., is of much value, the use of which limits the practically inevitable intestinal putrefactions. My experience fully sustains his contention.

Of medicines, alkalies before meals are proverbially valuable, especially one dose at bedtime, if gastric acidity be a feature; so a dose of sodium phosphate on waking, for a week or more at a time; occasionally calomel in small repeated doses is magical, the best "intestinal antiseptic"; also now and then a thorough cleansing by castor oil. After or between meals a half ounce of lime-water acts happily for overcoming eructations. The more physiologic use of hydrochloric acid is sometimes best, taken in two doses, one in the middle of the meal, the second at the end, to meet the "acid tide."

In the ptoses we have to do with a general disorder, hence all operations are of only the most incomplete advantage.

The most potent agent in overcoming the anatomical defects of the ptoses is to so tone up the muscles of the torso that they shall not only re-acquire their aforetime vigour, but become developed toward perfection. They should be made

to reach the highest grade of efficiency which the inherent resources of the individual is capable of attaining. They should become not only what they were, at their best, but as good as they can be made. No muscles in the human body are so neglected as those of the diaphragm, of the external abdominal muscles, and those involved in respiration. Systematic breathing exercises, even though they be clumsily and partially employed, produce gratifying results. When these are consistently taught, and faithfully practised, this measure alone will establish a degree of invigoration of the whole economy which will satisfy the most exacting. The patient should first learn to draw the abdomen forcefully and deliberately inward and upward, next to combine this forceful indrawing of the abdomen with the act of expiration. This, again, should be combined with other simple muscle tensions, such as flexion and extensions of the wrist, of the ankle, of the shoulder, girdle, &c. All acts should be a complex of respiratory, especially expiratory, emphasis plus a simple extension or flexion of a limb, or portion of a limb.* Along with this should be practised elasticising of the flexures, the joints, especially the hips, the pelvis, the scapular muscles, and torsion movements, rotation, &c.

In diagnosis of enteroptosis the older methods of inspection, palpation, auscultation, auscultatory percussion, are inaccurate; those by artificial distention with gas, transillumination, electro-diaphane, gyromele, &c., are relatively unsafe. The most accurate, perhaps the only really exact method, is Röntgenography. Hults' method of taking two views, one the patient lying on the stomach, and a second one in the standing or sitting position, gives the best results so far.†

* Recently, a most clever method of physical education is being taught by Mr. Allen Lester Fowler, which combines an expiratory effort along with simple tensions. This has already effected some excellent results for me.

† See *Transactions American Röntgen Ray Society*, 1905.

A large number of distressing and disabling symptoms are recognised as proceeding from the ptoses, some of which are stated correctly and others overdrawn. The general practitioner has need to keep these in mind and learn with all the exactness possible. Not only do we need to know the position, range, &c., of the organs, but we wish to estimate their motor efficiency. This can be done by permitting bismuth to remain in the stomach, and to observe when it becomes emptied. This, according to Boas, is accomplished of the food in five or seven hours, so Hults finds it with bismuth.* If it takes longer than that, insufficiency is shown. When it has reached the colon we secure additional important information on motor power.

Two factors enter into this problem always: (1) The degree of constitutional weakness, inherited or acquired; and (2) of the organic derangement. Often there are no sensory phenomena, so long, at least, as the general condition of the patient remains good (H. A. MacCallum, *British Medical Journal*, February 18, 1905). A large and various train of symptoms, ordinarily referred to as functional derangements, may give direct evidence of the form of tissue laxity, with secondary disorders which arise in, or are fused with, organic ptoses. The patient is most comfortable lying down, is miserable, depressed, weary, unable to think or form decisions, has dragging sensations, the digestion is poor, the stomach burns, he may vomit without relief, has no appetite, there occurs bloating, eructations, coated tongue will persist, irregularity of bowels, colic, epigastric or other tendernesses. The abdominal wall is usually flabby, readily manipulated and palpated. Specific symptoms are usually evidences of the acute involvement of some particular organ.

Symptoms due to prolapsed kidney are characterised by:

* *Op. cit.*

(*a*) Their acuteness; (*b*) frequent recurrence; and (*c*) rapid subsidence after the kidney is replaced (A. Ernest Gallant, *New York Medical Journal*, April 29, 1905). Dietl's crises can be recognised by any one; they come on without warning, with severe headache, nausea, vomiting, pain and unilateral swelling along the loin, or a general abdominal swelling, a sense of suffocation, an irresistible desire to loosen or remove all clothing and to lie down, followed in a short time by relief and freedom from pain.

Hydronephrosis is manifested by retention of urine soon after rising, along with rapidly increasing soreness and distension along the back and loin becoming "maddening," need to loosen clothing and lie down. On getting up again there is frequently imperative or continuous urination. Nausea is not common, and the attacks become less frequent. Jaundice, due to traction of prolapsed kidney on the cystic or common duct (Treves) occurs in those of lax, flabby bellies, coming on suddenly with pain.

Obviously posture will relieve many of these discomforts, but is only palliative, or if partly curative, is a tedious and objectionable form of therapeutics. Equally apparent is it that if the abdominal walls and adjacent supporting structures of the torso were of normal strength and tonic elasticity these phenomena would probably not arise at all, and would certainly soon cease to distress. To tie one organ up may relieve, but others are sympathetically affected and any may slip down, and the repair is at best but incomplete.

In my own considerable experience with all sorts of neurasthenics, I have had abundant occasions to verify my beliefs as to the frequency of the ptoses, obvious or latent. As to the treatment of the ptoses, it consists of repair of the underlying structural defects. These begin, and by no means end, in defects in the amounts and qualities of the nervous force possessed by the individual. The proper measures are

plainly to re-establish the balance of nerve force, the inherent vigour, and proceed to increase this later by developmental measures, whereby the patient often achieves unexpected general betterment. The local disorders disappear for good and all; they cannot return except by a return of general constitutional depravity. The measures employed are general rest, isolation, nutritive enhancement, &c. (see article by the author, "Rest Treatment," *International Clinics*, ii., 1901).

Posture is important, genupectoral position, the inclined bed, perhaps, for a time, especially manipulations on the tissues of the back, which certainly does enhance viscero-motor tone reflexly through the segmental centres, massage of the abdomen, intelligently directed or applied by the physician himself; above all, specific, definitely directed voluntary movements, educative in character, of respiration, thoracic action, and especially of the abdominal muscles. These are best combined with simple tensions of groups of muscles along with forceful abdominal breathing, and finally general educational movements adapted to the special needs of the case, not the haphazard long-range employment of professionals. The after-cure may well be moderate athleticism, golf, rowing, canoeing, bowling, croquet, &c., &c.

It is true we may need temporarily the help of belts or of peculiar corsets. The best one, in my experience, is that devised by Morris Longstreth, by which he claims to cure a multitude of ailments not apparently consequential. This consists of a wide belt of strong saddle girthing attached to the corset, which must fit well down two inches or more below the external trochanters, and be adjusted so that the pressure is upward and inward. No peroneal bands are required. It should be, of course, applied or fastened while in the dorsal decubitus. A woman of good motor intelligence (very different from psychic intelligence) can learn to drag her abdominal contents upward while standing, and then

adjust the corset. For men the belt can be used alone. After some months of suitable exercises, when the abdominal muscles have acquired full vigour, these devices can be discarded.

The efficiency of massage will be admitted by any who will allow themselves to judge fairly of the facts. So few physicians know anything about it of their own knowledge, or can judge of its quality by personal experience, that to them it evidences only a partial utility. Some actually condemn it because of discouraging instances. Much of this dissatisfaction is because they will not themselves acquire the art and apply it.

For myself, manipulations have enabled me to get results otherwise unobtainable. Applied by the physician himself, in the ptoses, it takes only a few minutes and no great effort : not a bit more of either than many specialists devote constantly to minor procedures on eye, ear, throat and skin. A few hints may help any to learn to use the dorsal manipulations. In five minutes all can be performed necessary to secure reactions. The degree of pressure on the lumbar region need never be over two or three pounds, alternating and distributed pressures. Follow these by lifting movements applied to the abdominal organs, first out of the right iliac fossa toward the umbilicus ; next the same in the left iliac fossa, lifting up and out of the pelvis the sigmoid flexure and other structures by a few slow tractions toward the same point ; finally, from the left side, with the left hand, push the contents of the abdomen from the symphysis pubis toward the thorax several times. Total time consumed is about four or five minutes. These procedures, repeated two or three times a week, will effect much, equal or more, than by professional massage, which, though excellent, is too often needlessly exuberant. An office nurse is useful to do all this, but, unless one is constantly busy with one line of cases, unnecessary.

BALNEOLOGY IN RELATION TO RENAL DISEASE.*

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In taking up the topic of balneology in renal disease, we shall not limit ourselves to the treatment of nephritis at mineral springs, but consider the employment of balneology in its broadest sense, and include in our discussion the use of the water at home and at the springs, taken internally, as a diuretic, and externally in the form of baths; including the various other measures which may be classed as hydrotherapeutic procedures.

From time immemorial the internal and external use of waters has been considered one of the most valuable of therapeutic aids (in Bright's) and properly so. But with a broader knowledge of the disease gained in our recent advances in its pathology, clinical observation and physiological research, its limitations have been more clearly defined and a better understanding has come of its utility. Thus we can now say that while we have no means at our disposal in selected cases so valuable as a therapeutic measure, indiscriminate use of balneotherapy may be fraught with great danger, and can do positive harm.

Let us, then, consider the type of cases which modern views of kidney disease have shown to be suitable for this form of treatment, and also those cases in which hydrotherapy may be considered to be contraindicated.

* For the discussion of this paper see p. 158.

Acute Nephritis.

In acute nephritis the internal use of water, either slightly mineralised or pure, is advocated by many from the very onset of the attack. In severe cases there is almost always a great reduction of the amount of urine voided, at times amounting to complete suppression, and generally there are more or less œdema and hydræmia. The contention of those who advocate the drinking of large quantities of water under such conditions is that the water stimulates the diseased kidneys, that in so doing the retained fluid in the tissues is carried off, and with this increased diuresis the kidneys are flushed out and the retained toxic matters which cause the distressing systemic disturbances are removed. If this contention were true there would be, of course, nothing further to say as to the wisdom of such a course of procedure in all such cases. But there is considerable difference of opinion among authorities on this point; we must look into the question a bit further before arriving at any conclusions.

Senator says, in the treatment of acute nephritis: "Therapeutic measures, having for their object the thorough flushing out of the kidneys are indicated, for this purpose the injection of large quantities of fluid, especially in the form of carbonated waters, &c., is useful."

Osler, in discussing this question, remarks: "The patient should drink freely of alkaline mineral waters, ordinary water or lemonade. The fluids keep the kidneys flushed and wash out the *débris* from the tubes."

On the other hand, Delafield thinks there is a tendency to exaggerate the dangers of scanty urine, and to be too energetic in giving diuretics. As the diminution in the quantity of the urine is due to the congestion of the kidneys, if we can decrease the congestion the urine will increase. He says the use of diuretics is to be avoided.

Again, Croftan claims that abundant water drinking is,

as a rule, irritating to the kidneys, and injurious to the over-taxed cardio-vascular apparatus. In acute and subacute forms of nephritis it is usually dangerous.

Von Noorden holds that in the beginning of acute nephritis water is eliminated with more difficulty than any other substance, including urea. Though later in the disease, when improvement takes place, the kidney acquires the power of excreting more readily than before, in that the congestion has partly subsided. An opinion that coincides with that of Delafield, as expressed above. He further declares that this diuresis does not necessarily carry off the accumulated toxic substances; therefore he believes that excessive water drinking is contraindicated in all stages of acute nephritis, and, in certain cases where only normal amounts of water are ingested, benefit will result from the reduction of this amount.

From the foregoing the preponderance of evidence would seem to show that the scanty secretion of urine is caused by the congested condition of the kidneys, and that their functional activity will be restored and symptoms disappear as soon as congestion shall have subsided. Further, that water may be a direct irritant to the kidneys in acute Bright's, by increasing congestion, that it is extremely doubtful that the solid matters may be carried off through the kidneys in these congested conditions, even when diuresis is induced by the stimulating effect of water; and there may be always a danger of burdening an already over-taxed cardio-vascular system. For these reasons it seems to us that a routine treatment of excessive water-drinking should be discarded. It should only be employed in the later stages of acute nephritis, when we may be reasonably sure that its effect upon the kidneys would be to gently stimulate them, or, only when we can assure ourselves by actual observation that the ratio between intake and output would not be productive of a retention in the body, or a burden to the cardio-vascular system.

Hydrotherapeutic Measures in Acute Nephritis.

All authorities agree upon the necessity of inducing active diaphoresis in cases of acute nephritis, and as to the great value of hydrotherapeutic measures for this purpose. There is some slight difference of opinion as to the most efficacious means to be employed, but in reality this difference is purely one of personal choice. There is also some difference of opinion as to the *rationale* in the various procedures, of which we will speak later. The employment of the hot bath at a temperature of from 98 to 105° F., and of fifteen to twenty minutes' duration, followed by wrapping the patient in warm woollen blankets, seems to be the favourite method. The hot pack is much easier to manage than the hot bath, and in many instances induces perspiration quite as well as the bath, but some patients object to the restraint caused by the pack and become very nervous and excited in it. The hot-air bath, to our minds, is more efficacious than either of the preceding in inducing diaphoresis, and is simpler to use, permitting freedom of movement and less annoyance. The most satisfactory arrangement for using the hot-air bath where electricity may be had is by means of a portable tunnel made of rubber or enamel cloth, covering a light framework. On the inner side of this are attached from six to ten incandescent lamps with a wire and plug which may be attached to the socket of the ordinary electric light fixture. The heat will be generated very quickly and can be regulated by the number of lamps employed. There is much less depression following the hot-air bath and sweating is induced much more rapidly and profusely than by either the bath or pack.

As we said above, there is some difference of opinion as to the *rationale* in the sweating treatment in Bright's. For many years it was believed, and is to-day for that matter, by many, that in sweating the diseased kidneys are not only

relieved from functionating but that there are carried off in the sweat certain toxic substances that the kidneys should excrete and thus they are still further spared. With this idea in view copious draughts of water or hot tea were administered during the sweating process to increase the diaphoresis and facilitate the excretion of the retained toxic materials by the sudorifermic glands.

The views of Senator, von Noorden, and Croftan are decidedly opposed to any such idea. Senator says: "Warm baths are useful in removing excess of water, but the specific urinary constituents, which are the mischief makers, are not removed in any appreciable quantity even by the most profuse sweating." Von Noorden holds that the only benefit of sweating lies in the withdrawal of water from the blood and tissues. He and his pupils have demonstrated that the perspiration of nephritics contains only a trace of urea—the maximum is about 1 to 1·3 grms. in the total quantity of a profuse sweat—while the remaining constituents are but harmless substances; and he further states that poisonous substances in the sweat have never been found. Both von Noorden and Croftan express themselves decidedly against the practice of giving large amounts of fluid during the sweating process, considering it both irrational and harmful. It is impossible to get rid of any toxic substances in this manner, the existing œdema is not relieved and may be increased, thereby adding to the burden of the enfeebled cardio-vascular system, and finally the kidneys are in danger of being further irritated in the endeavour to excrete the excess of ingested water. The beneficial effect upon the kidneys by sweating is undoubtedly due to the carrying off from the body the excess of water, and in thus relieving the embarassment to the circulation the consequent congestion of the kidneys is removed. As soon as a proper balance of circulation is restored and the kidneys resume

their function—this being evidenced by an augmentation of the flow of urine—it is unwise to continue diaphoresis with the hope of reducing the albuminuria. Sweating has no effect whatsoever in lessening the albuminuria, the debilitating effect of the profuse sweating will not be compensated for by any good that may come from it. Besides, when the kidneys become active it is best to have the urine as little concentrated as possible to reduce the possibility of irritation from the increase of solid matters. In view of what has been said above, patients suffering from acute nephritis should not be sent to the springs. The various hydrotherapeutic procedures which are useful in the treatment of such cases are easily carried out at home, and none of the advantages obtained from the spa treatment for chronic nephritis result to patients in the acute forms of the disease.

Chronic Nephritis.

Patients suffering from chronic nephritis of the parenchymatous form should never be sent to the springs. The treatment indicated for this class of patients is really that of acute nephritis, which, as we have shown, is much better carried on at home. Of those patients suffering from chronic interstitial nephritis, however, there are many upon whom a judicious course of balneological treatment at the springs will be found to have beneficial influence. It is quite customary to indiscriminately send these patients to springs for purposes of drinking and bathing, but by no means are all of them suitable cases for such a cure. In many of these cases, especially those of a gouty origin, the cardio-vascular changes have preceded the morbid condition in the kidneys, and the distressing symptoms for which the patient has come to us for relief are those originating in circulatory disturbances rather than of the diseased kidneys themselves. On the other hand, there is a class of cases in which there seems to be no especial disturbance of the circulatory system. These patients suffer from digestive disturbances, gradual

loss of flesh and strength, and anæmia. Their urine is excessive, of a low specific gravity, with a deficient excretion of urea, and there are present albumen and hyaline casts. As a rule, both of these classes sooner or later develop marked cardio-vascular symptoms with hypertrophy of the left ventricle, cardiac dyspnœa and other conditions of failing compensation. In all of them the indications for treatment are: First, to overcome perverted metabolism, thereby removing from the blood stream those toxic agents which by irritating the vascular system increase tension and ultimately bring about changes in the vessel wall; the kidneys thus also are saved from the work of excreting irritating substances. Second, to save the heart from undue strain and to strengthen the heart muscle. Third, to improve and increase the tone of the body generally. How far will balneological treatment meet these indications and what particular form of it should we advise?

It has been shown by P. B. Hawk in a series of experiments carried out on normal individuals, that copious water-drinking causes an increased excretion of nitrogen and phosphorus in the urine. The increase in the amount of nitrogen eliminated is due primarily to the washing out from the tissues of the urea previously formed, but which has not been removed in the normal processes; and secondarily, to a stimulation of proteid catabolism. The increase in the excretion of phosphorus is due to an increased cellular activity and the accompanying catabolism of nucleins, lecithins and other phosphorus-containing bodies. If we accept this statement of Hawk's our first indication will be met by the drinking cure, and we may expect to see some benefit in this particular in a judicious course of water-drinking in those cases in which there is no involvement of the circulatory system. Our own clinical observations would tend to corroborate this view. The small additional amount of urea which will be formed by thus stimulating the proteid

catabolism will be more than compensateed for in the improvement to the organism which such a result would bring about in the general improvement to all functional activity. As von Noorden has shown that the substances formed as a result of cellular catabolism are among those which are most easily excreted by the kidneys, there would be nothing to fear in this respect.

So long, then, as we are sure that the circulatory system is not taxed by an undue amount of water, which we may alone know by maintaining a constant ratio between the amount of fluid ingested and the amount of urine excreted, we may confidently expect benefit to those patients by a sojourn at some of the springs where the drinking cure is given. While it has been the custom to send nephritics to various of the springs for bathing, we consider, from a careful review of the opinions of various authorities upon this subject, supplemented by our own personal experience, only the following to be suitable cases for balneotherapy: First, that group of cases, especially those of gouty origin, in which the cardio-vascular system has not yet been affected to any considerable extent, which, for example, show no functional disturbances other than high arterial tension. These patients will derive great benefit at certain of the sulphur springs, where the baths, through their stimulating effect upon the glandular system and upon cellular activity, decidedly improve nutritive conditions and correct perverted metabolism. The stimulating effect of this class of waters upon the skin also tends to a certain degree to improve the tone of the circulation. Saline waters and carbonated saline waters have a similar effect, but to a less degree, upon nutrition. Second, that group of cases in which the cardio-vascular system has been impaired either primarily or as a result of the kidney disease. The symptoms presented by this class of cases are for the most part those of heart disease in the earliest stages of failing compensation. The mistake should not be made

in sending advanced cases of this variety to the springs for balneological treatment, for it has been demonstrated over and over again that such a course is most dangerous. The indications for treatment in this group are the maintenance of the heart's strength and the restoration of its impaired power. The waters that are best adapted to this purpose are the carbonated saline waters, the types of which are to be found at Bad Nauheim. One of the important effects of such baths is to lower blood pressure. The stimulating effect of the gas upon the peripheral blood-vessels, together with the lowering of the blood pressure, lighten the work of the heart and permit it to regain strength, which improvement to the circulation lessens the subjective discomfort to the patient. The baths should not be too cold (rarely under 90°), nor too prolonged, lest the good effect be lost. There should always be a sense of comfort after the bath. The bath should never be given except under the personal supervision of the physician or a trained attendant familiar with its effects, and the reaction of the patient to it should be carefully watched, noting the character and quality of the pulse, *before*, *during*, and *immediately* after. It is impossible to give directions for a series of these baths, or any other for that matter, with any certainty of getting the desired result. The reactive power and temperature sense of a patient will vary from day to day and, in order to get the best results and to avoid harm, the bath must be adapted to the conditions of the patient on each occasion. There are certain factors which, undoubtedly, contribute very largely to the improvement that these patients experience while at the springs, and these must be taken into account when we estimate the value of balneological treatment in renal disease; we refer to their regular manner of living, their freedom from excitement and the little perplexities attendant on routine life at home, the change of environment, all of which have a most beneficial influence irrespective of the active balneological treatment that may be employed.

THE USE OF WATER AND HEAT IN THE TREATMENT OF RENAL DISEASES.

BY PHILIP MARVEL, M.D.

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THE influence of hydrothermal therapy upon the human body in both health and disease is no less a complex question than is the study and administration of various other remedies. The individual, as well as the disease, becomes an important subject of careful study, from the standpoint of temperament, environment, idiosyncrasy and psychical influences; the disease from its local, systemic, incomplete or complete involvement, and its relational disturbances. Hydro-stimulation, with increased or diminished temperature is, in many respects, closely related to mechanical stimulation, such as is incited by massage, cutaneous friction, and succussion, and induces a heightened or lowered tonicity in all the involuntary muscular structures in the areas directly or reflexly affected by the neural impulses set into activity through cutaneous contact, according as the period of stimulation may be a brief or an extended one. The influence of the stimulation for good or evil will be modified by the mode and intensity with which the contact is made and the degree of temperature employed. The responsive reaction under the influence of a topical application to, or a complete immersion of, the body in water, at varying temperatures, constitutes the most important part of the treatment for the relief of disease and its varied complications. As a result of mechanical

contact, by fluid or solid bodies under regulated control, muscular activity is increased, and this increase of muscular activity insures a larger production of animal heat, and augments the individual resistance against fatigue.

Whilst the primary stimulating effect of a sudden bodily contact with a liquid, the temperature of which is either very hot or very cold, is virtually the same, when prolonged, the secondary effects will vary quite as greatly as will the degrees of temperature separating the two ; but I do not hold, as some do, that the lowered tonicity and muscular relaxation in the arterial muscular fibres succeeding a prolonged hydriatic stimulation, partake of the same reaction and loss of power in the cardio-vascular system as is associated with partial and complete paralysis. In the former the reaction would seem to be one which lessens the cutaneous sensibility and diminishes the reflex excitability without primarily disturbing the central nervous system, beyond that of inciting neural impulses, and necessarily exhibits a different relation to the blood streams and blood-vessels, than the relaxation and paretic dilatation, which follows trauma, toxic infection, or any centric or peripheral paralysing cause ; and when pathological changes do follow, as the immediate result of hydriatic procedures, they are always secondary. In the latter the pathological changes, as well as the functional disturbances, are more likely to be primary ; therefore the physiological effect of hydriatic stimulation of the body will be that of an excitant and depressant ; the therapeutic application that of a tonic and a sedative. Hence, in a word, the value attached to hydrothermal therapy, with relation to its accelerating and inhibiting action upon the cardio-vascular forces and the nervous mechanism of the body, may be stated as a tonic, strengthening the heart, prolonging its diastolic pause, and increasing the period of nutritive rest without any toxic cumulative effect, such as follows drug stimulation, and a support-

ing force to the nervous system, through promoting a better and more nearly normal nutrition. When heat is applied at a high temperature to the body the capillary vessels dilate, become flaccid, and exhibit signs of loss of tension. If cold be applied, and not too long continued, the vessels will exhibit a tonic resistance and show evidence of a heightened tension in their walls. These facts have been made significant by pulse tracings, measurements of blood pressure, and recording of temperature data, some of which have been published by Winternitz, Strass, Wertheimer and Baruch.

I have observed the blood pressure rise as high as 32 mm. of mercury under the influence of the cold bath, and an equivalent lowering under the influence of a hot immersion bath. In this connection it is of interest to call attention to statements made by Dr. S. Baruch, of New York, in a lecture at the German Hospital in Philadelphia, in 1897, in which he refers to some observations made by him. The doctor, in detailing his reports of the various cases, referred to repeated observations in which the pulse tracings of the same patient before and after a hot-air bath showed distinct evidence of a weakened ventricular contraction, absence of tidal and obtuse percussion waves, which condition was greatly improved after being subjected to a rain bath for one minute. In Case No. 1 he reports that previous to being placed in the hot-air bath, the pulse was 70, temperature 98°, and respiration normal. Subsequent to exposure in the hot-air bath at a temperature of 185° for ten minutes, the pulse rose to 100, temperature 99·2° F., respiration 64. The patient was then subjected to a rain bath at a temperature of 80° F. for one minute, when the pulse became 72, the temperature 98·4°, and respiration normal. The decided improvement in the ventricular contraction, high and quick up-stroke and acute percussion wave, with marked tidal wave, is distinctly shown in the sphygonographic tracings published with the said lecture. Thus, it is

seen that after a thermal procedure administered to a healthy individual, the disturbed circulation which was produced by long exposure to heat rapidly improved under the influence of a hydriatic procedure when under proper control, and experience has proved the same to be true in disease when the conditions present are intelligently considered, and the treatment properly directed.

According to the observations of Strass and Wertheimer, after the application of general hydrothermal procedures to the entire surface of the body, they observed, with rare exceptions, a very large increase in the number of leucocytes; also a considerable increase in the number of red cells, and in the percentage of hæmoglobin. The maximum increase in the number of erythrocytes in eighty cases examined by them was 1,860,000 in the cubic millimetre, and the maximum increase in the number of leucocytes was almost thrice the number previously counted. The average increase in hæmoglobin was about 14 per cent. It was further observed by them that the maximum increase in the red and white cells, as well as in the percentage of hæmoglobin, did not always occur immediately after the application. The highest figures were often obtained after the lapse of an hour or more. These remarkable physiological alterations in the constitution of the blood persisted for varying periods. Often the increase of the number of erythrocytes, as well as that of the leucocytes, could be demonstrated for at least two hours after the application of the bath, and in not a few cases the increase produced by the hydrothermal stimulation did not entirely disappear. There is, therefore, no doubt that the hydrothermal stimulation affecting the surface of the entire body releases the tensions in the deeper vessels, and improves temporarily the circulation in the superficial and capillary blood streams, thus adding a new impetus to the general metabolism and assisting in the release of many functional

burdens. Surely we have knowledge of no therapeutical agent or agents that are capable of producing more decided beneficial results, easy of demonstration, and at the same time so harmless in their remedial effects, when employed rationally and under proper guidance, than the hydrothermal procedures.

With the foregoing as an introductory, let us now consider more particularly the subject in question, namely, the hydrothermal treatment of renal diseases.

Water is a very flexible agent, and the skin to which it is applied is a vast network of capillary blood-vessels, nerve, terminals, and cellular structures, rendering it an important organ of sense, of temperature regulation, and of secretion. Thus, the sensory nerve apparatus of the skin becomes to the human organism, by reason of its temperature sense, and direct and reflex receptability, as a sensitised plate to the photographer ; therefore, the intimate relation existing between these cutaneous functions, and the functions of the remaining portions of the body, renders the former a proper point of attack for beneficial or harmful influences. The hydrothermal application of water and mechanical stimulation, the influence of which is reflected through the sensory, motor, and vaso-motor tracks, affects directly and reflexly the general metabolism and eliminating forces. In the treatment of disease, in addition to the primary influence which one expects and readily obtains, we must not lose sight of the fact that one of the results of hydrotherapy is the re-establishment of circulatory equilibrium, the inhibition of nerve dissipation, and the restoration of normal metabolism.

In the brief references which will be made in this paper to the treatment of renal diseases, it is sufficient for our purpose to divide these diseases into two classes only—namely, acute and chronic. The symptomatology of each is so well known that I need not devote any time whatsoever to a description of the same, and, therefore, shall engage you

at once in the discussion of the application of hydrotherapy in their treatment. In the acute as well as in the chronic form, the condition of the patient at the time of the treatment must invite our first consideration. Having given proper attention and thought to the particular deficient functional force or forces, the evidences of the disease present, temperament, strength and endurance of the patient, one would proceed to use the application of hydrothermal therapy, with varying temperature, by means of the drip-sheet, blanket, topical or general pack, the tub or needle, and rain, spray, steam, electric light, or hot-air cabinet. In acute cases, if the temperature be high, urinary secretion be not abnormally lessened, unless the patient be too enfeebled, the intermediate or neutral immersion bath at a temperature of 94° to 98° F., with passive motion from six to eight minutes, may be used with great benefit, the patient to be wrapped in a blanket without further muscular effort, and allowed to remain quiet for eight, ten, twenty or thirty minutes, as may be required, after which time the different members of the body may be carefully dried without exposure, followed by a light surface friction or light massage. The immediate influence of such a procedure is often reactory and exceedingly beneficial. With those whose resisting power is sufficient, the reaction may be intensified by a quick douche or sponge at a temperature of 85° to 86°, lasting only a few seconds, and followed by similar procedures to those above described. If the patient be too feeble to be tubbed, then the physician must exercise his judgment in the use of the complete or partial pack in a blanket or sheet at a temperature of 100°, 102°, 104°, or 105°, followed by a five, ten or twenty minutes' rest, and after that careful changing, with or without cutaneous friction or massage, and rest. The influence of these treatments, in some instances, may be enhanced by the internal administration of small quantities of water, frequently taken.

The treatment of the chronic cases will require a greater variance in temperature and mechanical manipulation than that of the acute. It is necessary, in some cases, to use the hot-air cabinet to stimulate the glands of the skin, so that they may assist in eliminating the toxins, which rapidly multiply, and which in part are thrown off by way of the cutaneous surfaces. In the majority of cases, however, of this class, it will be perfectly safe to follow the warm bath (which may be better applied at a lower degree, 90° to 96°, and those much enfeebled, 100° to 102°) by an exposure of eight to ten seconds, with a douche, pour, needle, or sponge, at a temperature of 78° to 82°, which may be gradually and daily reduced to 70°. In some instances it will be of advantage to allow the patient to be immersed in the warm tub for at least fifteen to twenty minutes, subsequently followed by a light shower, rain, or sponge, with friction or light massage. Neither the chronic nor the acute forms of renal diseases can be dogmatically classified. The time of the exposure, the temperature maintained and the procedure employed, all must be determined by the patient treated and the results obtained. It has been my observation that a few of these cases will not respond at all without prolonged immersion baths, whilst others are apparently ill-affected by extending the same. It is my belief that the average time should not be long, and eight to ten minutes has seemed a proper average for a number of cases. There are fewer objections to repeated treatments of twice or thrice daily than to very long exposures at any one time. Other forms of baths and applications may be used according to the ingenuity and judgment of the physician, as the therapeutic influence is most largely to be obtained from the temperature used, time of exposure, attention to a conservation of the patient's strength, and protection against too great a disturbance of the circulatory and nerve equili-

briums. Certain special cases of nephritis, with dropsical effusions, such as are found in scarlet fever, diphtheria, small-pox and puerperal states, &c., with complications, require treatments of comparatively low or neutral temperature, or stimulating packs at times, including only a portion of the body, fortified by the use of the hot-water bag placed at a convenient position along the vertebra, preferably between the shoulders. If the blanket or pack be made at a temperature of 76° to 80°, the patient's body wrapped therein, artificial heat by means of the hot-water bag or hot-water bottle can easily be placed so as to stimulate the heat centres and prevent the stimulation contact becoming too severe. In not a few of these, and other cases of nephritis, when the patient is weak and anæmic, or anæmic with only a reasonable amount of resistance, it is good treatment to have him first snugly wrapped in a dry, warm blanket for ten to twenty minutes, before applying the moist or wet pack. The reason is obvious and needs no further dilatation.

Special attention should be called to that class of cases which is complicated by organic heart diseases, especially those of advanced myocardial and endocardial changes, with auricular or ventricular dilatation, and to those with limited cardiac changes, but advanced arterial changes. With the former, too much care cannot be exercised, and, with few exceptions, any hydriatic procedure should be provided for on a bed or couch, or at least some easy means where pronation can be maintained with slight disturbance to the circulatory forces. When dyspnœa is marked, a semi-recumbent position, either dorsal or lateral, should be provided, and the psychical influence, as well as the immediate disturbance from the procedure noted. Here, in particular, the knowledge and skill of the physician or nurse administering the treatment must be closely given to the patient, as much damage may follow a careless and undue amount of

handling; too high or too low a temperature; too great a stimulation and consequent cardiac excitation from the mechanical contact of the water, as by spout, pour, or rain bath; too prolonged a treatment, thus contributing too great a disturbance to the circulatory forces.

In a word, the beneficial use of hydrothermic procedures in the treatment of renal diseases is found in the application and regulated control of mechanical and thermal forces, so intelligently manipulated that they become equally stimulating or sedative, as may be required, and to the weakened, overwrought, or excitably tensioned forces of the body, thus assisting Nature in her vital processes of tissue and functional restoration.

DISCUSSION.

Dr. J. M. ANDERS (Philadelphia): Unquestionably the subject of climatology in relation to nephritis is a very important one to the general practitioner, and it is equally certain that it has been exhaustively considered by the essayists. While the principal facts have been adduced, there are a few points which deserve further emphasis. In the first place, it has for years seemed to me that to send patients, especially those suffering from nephritis in the incipient stages, to a comparatively dry climate at sea-level or a slight elevation, gives equally good results as a truly warm, dry climate. We have a number of health resorts in New Jersey, *e.g.*, Atlantic City, Cape May, Hammonton and Lakewood, which afford a relatively dry climate throughout the greater part of the year. Two additional advantages of great importance are furnished at these health stations, viz., an appropriate dietary and competent medical supervision of the cases. One of the principal objections to the majority of health stations are the strong wind currents. As Dr. Phillips* said, strong currents facilitate evaporation from the body; but they do so in an irregular way, and cool the surface so rapidly at times as to produce chills. For this and other reasons these resorts should be efficiently protected from strong winds. The paper of Dr. Ransom on the use of water taken internally in nephritis interested me very much. In my personal observation the use of water internally, if systematically carried out, tends to increase the flow of urine, and hence, to an equal extent, tends to hasten the elimination of solids, which act injuriously if retained in the system. As has been stated, very few solids are eliminated, particularly urea, through the skin from the use of the dry heat or wet pack, but by

* See index for article by Dr. Phillips.

forcing the blood to the peripheral vessels, we thus relieve congestion of the kidneys. The amount of urine, as an immediate result, is increased, and elimination in a great measure restored. I would therefore urge strongly the use of water as a diuretic as well as a diaphoretic. We can give more water than is useful, but I have made it a general rule not to exceed three quarts daily. Von Noorden has also shown experimentally that three quarts of fluid *per diem*, in these cases, does not increase arterial tension. I was impressed with what Dr. Marvel said concerning the duration of baths in chronic nephritis. I believe it better to give a repeated short, rather than a prolonged hot, bath. This brings me to say a word on a point to which I attach the greatest importance. Dr. Sewall incidentally referred to it when he said that discrimination is necessary in dealing with these cases. Nothing is superior to a careful individualisation of cases of chronic nephritis. For example, it is unwise to send a patient with chronic nephritis with dilatation of the heart to a moderate elevation, even constantly, for we see disastrous results from over-stimulation, under these circumstances a low pressure bringing about a more rapid dilatation. On the other hand, I have seen more than one case of chronic nephritis, with good compensation, combined with tuberculosis in the incipient stage, do exceedingly well at health stations moderately elevated, say from two to three thousand feet. After we have made our diagnosis of chronic nephritis, we must not only recognise the stage but especially the peculiarities presented by the individual case with reference to the condition of the heart and other organs; we should then go a step further and take the precaution never to send a nephritic to a resort where he cannot get appropriate diet and competent medical supervision of his case.

Dr. Guy Hinsdale (Hot Springs): I was interested by the remarks made with reference to the action of the hydrothermal treatment on the rate of the heart and respiration in connection with the paper read by Dr. Marvel. The statement is made, and it is true, that as soon as the reasonably healthy subject is put into a hot-air cabinet and allowed to remain at 105° for ten minutes, the rate will rise to 110 or 120; then after the application of a rain douche or a needle douche, starting at 105°, reducing it to 60°, the pulse rate will fall from 120 to 65 inside of five or ten minutes. While the other treatment is being carried out and the patient is being dried and laid on a couch, the pulse falls until it touches a mark by 40 to 50 points below what was noticed after entering the cabinet. That is true of patients with sound hearts, but when you have a valvular disease, for instance, mitral regurgitation, and where the muscular elements of the heart would permit you to employ a bath of that kind, I have noticed that the difference between the high and low mark of the pulse is much smaller, so, instead of noticing a variation of 30 to 50 beats between the high and low, we get a much less variation, perhaps but 10 or 15. I do not offer an explanation of such an effect. The condition of the heart is also another guide to the amount of water you are permitted to give internally. I believe it unwise to give in cases of renal disease with weak heart, especially where there is œdema,

much water. Give it in the form of milk ; in that way affording nutrition and a supply of liquid for the blood. About three or four pints of skim milk are given, a much better action being obtained with skim milk. The rules which were outlined by Dr. Ransom for treatment meet my views. Certainly no nephritic should be sent far from home, if at all. In cases of chronic nephritis, especially where the climate as well as the character of the waters are suitable, we can make use of the spas favourably situated, where outdoor life can be had. The whole class of salines is to be excluded in cases of nephritis, so that every particle of salt that is added is only a load on the kidney, and chloride retention is a disadvantage in the treatment of nephritis. Waters that do not contain more than from one to three grains of solid contents, and waters without sodium chloride, should be taken. I must express my admiration for the papers that have been presented.

Dr. R. H. Babcock (Chicago) : I really was desirous of remaining silent this morning. There are, however, one or two thoughts I should like to express, confining my remarks to chronic nephritis. The time has come when we no longer fasten our attention on the kidneys, as we do on the cardio-vascular system. This is the trend of modern therapy, thanks to the teachings of Von Noorden. Chronic nephritics die from the heart rather than the kidneys. So long as the heart remains competent, disease of the kidney is a subordinate matter in a certain sense, that is, so long as the heart is competent, renal elimination is sufficient, provided the system can be spared the results arising from intestinal toxæmia. We must look at our cases from the standpoint of hypertrophy on the part of the heart and compensation. When a case manifests cardiac dilatation and inadequacy, the matter is a serious one and assumes a serious aspect. I believe, then, that when chronic nephritics do not do well, it is because the heart has begun to fail. I think this matter should also be carefully considered with reference to the balneology, and this was touched on by Dr. Ransom. I would like to differ with our Secretary, Dr. Hinsdale, with regard to the use of purgative waters. Sodium chloride is objectionable where we have a sodium chloride retention, but all cases do not manifest this retention. I believe purgative waters in certain cases are of great value by flushing out the intestinal tract, and thus ridding the system of toxins and preventing intestinal toxæmia. Purgative waters also lessen abnormal pulse tension. The attention of the doctor must be rivetted on the blood pressure. It is when this is abnormally high that it threatens cardiac adequacy.

Dr. C. L. Minor (Asheville): I was glad to see that in Dr. Ransom's excellent paper he dwelt upon the advantages of the use of hot dry air as a diaphoretic, for I do not believe that members of the profession use such hot dry air as often as they should, being more apt to use hot wet packs, which are not as efficient and in the use of which it is difficult to be sure how freely the patient is perspiring. An electric light apparatus such as the doctor refers to, while very useful if electric current is in the house, is useless otherwise; but I have been always able to improvise a most satisfactory apparatus with four or five

barrel hoops cut into half circles and nailed at their ends to two longitudinal rods of wood. This I place over the patient lying on a blanket and naked, and cover the hoops with several layers of blanket to retain the heat. Over a large sun lamp or alcohol lamp I place a tin pipe bent at right angles, carrying the other end into the foot of the bed, and hang a thermometer inside the tent. With such an apparatus the temperature inside can be properly controlled, and its sweat-producing effect is very great. If I heard the doctor's paper correctly, he did not refer to the use of catharsis, which should not be left out of the treatment of any such case. By the use of salines combined with dry hot air we can remove a large amount of poisons from the system while giving the kidneys themselves absolute rest, which in acute inflammations is often necessary. Apart from its other manifest advantages it seems to me that milk diet has the advantage that it combines an excellent non-irritating nutriment with a large amount of water, and when we are using such a diet the amount of extra water the patient must take can be cut down. As to the effect of altitude in such cases, and speaking for the altitude of Asheville, of 2,200 feet, I have never seen any harmful effects from that altitude. The only thing that should be considered is that all altitudes in the winter time are cold and more liable to sudden changes of temperature than lower places; hence I do not think that in the winter nephritics should ever go to any mountain resort.

Dr. BOARDMAN REED (Philadelphia): No mention has been made of the frequent inadequacy of the stomach to empty the large amount of water or milk prescribed. The stomach must be strong and not dilated in order to empty itself, and as there is no absorption from the stomach itself, this fluid must be propelled on into the intestine before it can be absorbed. We frequently have dilated stomachs in these cases. In cases of nephritis caused by intestinal toxæmia, the latter is very often due to some serious fault in the stomach, especially atony or dilatation.

Dr. GUY HINSDALE: I had not intended to neglect mentioning the mineral waters in the treatment of nephritis. We should use those containing magnesium sulphate or Rochelle salts. The Spanish and Austrian waters are heavily loaded with magnesium sulphate.

Dr. J. B. WALKER (Philadelphia): I would like to say a word in favour of the use of water as a dietary and cleansing article for the blood and renal tubules in most cases of renal disease. There are certain stages of the disease when excessive use of waters is objectionable, as in acute intense engorgement with high tension of the blood-vessels, but as soon as the kidney secretion begins, water is one of our best aids. Water should no doubt be withheld in chronic cases with great anasarca and hydrops of the cavities, where attempts to get rid of the water already in the system are paramount; but in the vast majority of cases of renal disease, acute and chronic, *water* is one of our best remedies and absolutely indispensable.

Dr. J. H. PRATT: As Dr. Babcock has just stated, the danger in chronic interstitial nephritis is from cardiac insufficiency rather than from renal

insufficiency. In this class of cases I have chiefly employed carbon dioxide baths. There is another type of chronic nephritis that differs markedly from this. Pure cases of this form of nephritis are rare, but they form an important group. In these cases the blood pressure is normal, the heart little if at all enlarged, and subjective cardiac symptoms are absent; but œdema is present, the urine is highly albuminous and usually contains numerous casts, and the danger is not from cardiac but from renal insufficiency. In these cases I should like to make a plea for the electric light bath in conjunction with a salt-free diet. The electric light bath has attracted little attention in America, the country of its birth, but is extensively used in Europe. The first one I saw was in Grocco's clinic at Florence, Italy. I have had an octagonal cabinet constructed similar to one I saw in the City Hospital in Munich. It is lined with plate glass mirrors and contains 48 sixteen-candle-power lamps. The electric light bath has a number of advantages over the hot-air bath. Sweating occurs at a lower temperature and is more profuse. It is less debilitating. I have never seen a patient who did not prefer an electric light to a hot-air bath.

Dr. S. D. RISLEY (Philadelphia, Pa.): This group of papers and the discussion have been both instructive and interesting. In my own special field of work the opportunity for the study of kidney affections is relatively limited, but the cases coming under observation, associated with ocular disease, may be placed in two very well-defined groups, widely separated by their symptomatology, their prognosis, and the treatment required for their relief.

In the first group the patient comes because of some impairment of vision, often sent by his physician, and may—usually does—consider himself in good general health; but ophthalmoscopic study reveals too red optic nerves, a hazy, cinnabar-red fundus, full, dark veins, the retinal arteries with grey-white borders suggesting the early stage of an arterio-sclerosis, and then will often be found on careful inspection a few small flame-shaped hæmorrhages in the fibre layer of the retina. He may or may not suffer from headaches. There is likely to be an accentuated first sound. The urine has a high specific gravity; there are a few hyaline and possibly granular casts and an intermittent albuminuria, often discovered only after repeated daily examinations. He has recurring attacks of intestinal disorder, constipation alternating with diarrhœa.

I have long regarded these cases as examples of the incipient stage of pathological change in the general vascular tree which is progressing, *pari passu*, with the kidney disease, or the nephritis may be a secondary manifestation. In these patients, having corrected the intestinal conditions by free purgation, I have never seen harm result from the free use of water, but great benefit follow the employment of either the alkaline laxative waters or the charged distilled water. In the second group, the picture as seen by the ophthalmologist is a totally different one. The ocular manifestations make it only too obvious that there will be a speedy execution of the fatal mandate. There is serious impairment of vision with nocturnal

or morning headaches; scanty or abundant urine of low specific gravity loaded with albumin and casts. The ophthalmoscope shows œdema of the retina, great swelling of the optic nerve, which is concealed and surrounded by a snow bank infiltration, while the eye ground is well covered with innumerable flame-shaped hæmorrhages in the fibre layer of the retina; appearances probably indicative of intracranial conditions also. There is more or less cardio-vascular disturbance, a dry skin, marked nervous irritability and insomnia.

In these cases, in my experience the free use of water in any form is likely to be harmful. I have seen the headache, insomnia, and eye symptoms aggravated, apparently by the use of an alkaline water, and in one case sudden deafness caused by a complete filling up of the tympanic cavity in both ears, which was speedily relieved by using the Eustachian catheter.

The danger from the use of common salt which was alluded to by one of the speakers, recalls the case of one of my patients suffering from Bright's disease of the retina who had been told by a neighbour that the free use of table salt in hot water, to be taken at the beginning of each meal, would prove a panacea for all her ills. After a week of such treatment, she had an attack of uræmic convulsions from which she passed into the characteristic coma of lithæmia. I have always felt that there was a distinct relation between this attack and the free use of salt water. I am sure that in the treatment of this class of patients dry heat is far more beneficial than the steam bath or hot wet pack. No special apparatus is necessary to secure it where the electric current is installed. For a good many years I have used it habitually to secure a free action of the skin instead of pilocarpine injections in many ocular affections. It is much more efficient and has no depressing effect, but under its action the skin becomes moist, perspiration free, the nervous irritability disappears, and the patient will often pass off into a calm sleep in the midst of the hot-air bath. All that I employ is a 16 to 25-candle-power lamp, being careful that it shall not come in contact with the bedclothing. A tent is made of the bedclothing which can be readily done with a small chair. A lamp encased in a wire netting is then placed under the chair. The ordinary bedspread over the blankets is sufficiently impervious, so that even a rubber blanket is not needed. My experience in a single case will serve to illustrate both the method and its efficiency.

A 25-candle-power lamp was placed under the tented bedclothes in the case of a patient with albuminuric retinitis who was extremely nervous and irritable, was unable to sleep and was suffering from violent headaches. The skin was hot and dry, urine scanty and loaded with albumin. In ten minutes the skin became moist, and in fifteen minutes a profuse perspiration came on, and while in the bath the patient slept. In a few hours the kidneys acted freely and the patient passed readily into a happy and temporary recovery. This electric bath can be repeated daily or oftener. In the cases under discussion and for other affections, I have kept it up

for many days without general depression. I believe it to be more beneficial than the hot wet pack. When the skin and kidneys are acting freely, we can then resort to the free use of water, preferably the distilled water, charged with carbonic acid or not, and to skimmed milk diet with safety.

Dr. S. G. BONNEY (Denver, Colorado): I am sorry that I did not hear Dr. Hinsdale's remarks. It seems to me that we all agree as to the wisdom of a judicious diaphoresis and catharsis, and that the difference in opinion relates to the extent of water ingestion and the administration of salt. The thought which impresses me is that the principles governing the treatment in one case might not be applicable to another, and, further, that any given case might require one method of treatment to-day and in a few hours something radically different.

I recall a patient of Dr. Tyson's, who came to Colorado in apparent health. She developed, within the first twenty-four hours after her arrival, complete coma, which persisted for twenty-one days, due to nephritis. In her case there was practised not only catharsis and profuse sweating, but also frequent daily subcutaneous injections of salt infusion, to which I ascribe in large measure her speedy recovery.

This was several years ago, but we are now taught that salt is detrimental in such cases, particularly when œdema is present. A month ago, I attended the wife of one of my tuberculous invalids, with pronounced œdema. I found her seven months pregnant, with startling œdema, and found that there had been complete anuria for thirty-six hours; blood pressure very high, nausea, restlessness, and other evidences of uræmic poison. I promptly induced labour and put her upon catharsis and frequent and profuse sweats. In this case it seemed to me, on account of the œdema, that if there was any one thing contraindicated it was salt infusion, in the light of our recent knowledge concerning the influence of salt in increasing œdema. Within ten hours, however, I was obliged to resort to the subcutaneous use of the salt infusion in order to save life, as she had rapidly declined and developed a severe collapse. It was not found necessary to repeat, and it was used purely as a cardiac stimulant.

The salient thought is that each case is a law unto itself, and that the indications may be different at different times in the same individual.

Dr. HENRY SEWALL (Denver): I wish there were time to discuss this question. I would like to know from the gentlemen who have most experience in the bath treatment, how closely they are governed by the fear of giving the hot bath in cases of arterio-sclerosis, and whether they restrict or temper baths in accordance with high arterial tension not marked by arterio-sclerosis?

Dr. W. F. R. PHILLIPS (Washington): I have not much to add. Each case should be handled by itself, because we know so little about the etiology that it would be absurd to prescribe any plan as a general plan. Any plan must be based on our conception of the etiology of the disease. The importance of physical therapeutics, as heat, moisture and light, to relieve the condition, and that when we are giving water, we are merely

doing one of the things that produces the effect by the agents I have already named.

Dr. C. C. Ransom (New York): In relation to the question asked by Dr. Sewall, my feeling is that in cases of marked arterio-sclerosis baths are contraindicated. If they are used at all they must be used with the utmost care. Patients in whom there is high tension without arterial change are pre-eminently adapted for the baths. The class of waters which may be used with the best advantage in this class of cases are the sulphur waters, which have marked effect in restoring perverted metabolism. One of the most important factors to be considered in sending patients to a cure for renal disease is, that they should be under proper medical supervision: it overbalances everything else. One of the great disadvantages in sending patients to Nauheim is the fact that in most instances it is impossible for them to receive proper medical supervision, because of the great number of patients that the prominent physicians there attempt to see each day.

Dr. Philip Marvel (Atlantic City): I have been much pleased with the discussion pertaining to the renal aspect of the papers, but somewhat disappointed as to that which to me seems more important, viz., the arterial aspect. Dr. Babcock has discussed the latter feature more than any one else. It seems to me that we must take into consideration that many cases of renal disease are secondary to cardiac disease, as well as the reverse. If we take these cases of renal disease, whether they are primary or secondary, that are accompanied by myocardial changes, *i.e.*, in which the heart may be dilated, or where there may be a hypertrophy accompanied by arterial disease, we have two distinct propositions. In the former, we need to support the heart in its action, and in the latter, restrict or control it. In these we have two questions which require the opposite sort of treatment. I want to emphasise one point in the use of hot water in cases where the heart is weak and flaccid or overworked. In these cases the application of hot water too prolonged or at a degree of temperature too high, is injurious. You may use hot water at a temperature of 102° or 104° if you use it as a contact stimulation, but do not prolong it. Cold water may be used in these cases for its primary and secondary influence, but must be used carefully and with a knowledge of what you expect to do with it. Regarding Dr. Sewall's question which Dr. Ransom answered in part, I will answer another part of it. There is often a high tension pulse where there is no arterial sclerosis. Hare has recently written a valuable contribution, where we have a decidedly high tension with little or no arterial change. My attention has been called, not infrequently, to cases where we have a nervous tension, and with these I have found the immersion warm bath, prolonged for eight or ten minutes, followed by a rain shower for about five or six seconds, of great advantage. The neurasthenic element is present in these cases, and we have no remedy better for the relief of reflex disturbances than the application of varying temperatures and mechanical force.

THE HOT MORNING BATH.

BY NORMAN BRIDGE, M.D.
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THE cold morning bath has a widespread and high reputation in this country as a wholesome measure for both the sick and the well. A large number of healthy people believe that it has power to keep them well, and they take it regularly, if not daily, and say that they enjoy it. They rise from their beds in the morning, get into the tubs of cold water or sponge their bodies with it for from one to five minutes; then dry themselves and rub their skins thoroughly with coarse towels to produce the thing called a reaction. If the reaction is secured they have, on being dressed, a fine feeling of skin warmth, and a sense of power that is pleasant in the extreme. They come to breakfast with good appetites and start the day's work with vim; they have pink cheeks and lips, and look well.

Vigorous people with good physiologic power of heat production have little difficulty to secure the coveted reaction. But many weakly and sick persons, impressed with the value of the cold bath, try day after day, and try in vain, to get a similar reaction. They shiver during the bath and for some time afterwards, and have blue lips and finger-nails and pale faces for hours, with perhaps a slight headache and general discomfort of the limbs and joints. They do not find comfort or increasing vigour from the baths, but often go on taking them daily for months or years in the hope of benefits that

are not realised. They do not like the cold bath, it is a daily ordeal to them; they hate it, but as they have been taught that it is a therapeutic and hygienic measure of great value, and feeling, as they mostly do, that its use is an evidence of courage, if not of strength, they go on accepting its punishment.

A large number of consumptives both in and out of sanatoria are taking this sort of a bath every day of their lives. It is prescribed in many of these institutions, and believed by some of the physicians in charge of them to be a measure of very decided value. Some of those who are a little sick are able to take the bath in water direct from the well or the hydrant, but the more weakly ones, and especially the bed-patients, are usually unable to stand the strain and must take a warmer bath or none at all. Some of these invalids, however, try long and suffer greatly in an unsuccessful effort to inure themselves to the cold bath, before they acquire sense enough to give it up.

One of the curious facts connected with the practice of the cold morning bath is, that so many of its votaries declare positively that they enjoy it. As a matter of fact, nearly every one dislikes the dash of cold water in the morning. They like the reaction if they can get it, which makes them feel good for hours, and so they say they delight in every stage of the bath, and doubtless believe they do. It is manifestly absurd that the average man, sick or well, should enjoy getting out of a warm bed in the morning and plunging into a tub of cold water; and the franker and more discriminating ones candidly confess that, except in very hot weather, they shudder at the cold water both before and after they enter it.

But it is in the popular mind, among many of the more fastidious of us, that a daily bath, or one nearly every day, is necessary for health. That venerable error which reads that "cleanliness is next to godliness" has become a part of the religion of a great number of people. Some kind of a bath

must, they think, be taken, and the only one that is really pleasant, the warm or hot bath, is forbidden by lay opinion, and to a large extent by professional opinion also, as being dangerous when taken in the morning, and so the cold one seems inevitable. The hot bath is more agreeable to nearly everybody than the cold, but we have been taught for generations by putative hygienists, by books, professional and otherwise, by many thoughtful physicians, and a little, it may be, by an ethical fetish inherited from some severe religious past, that whatever is pleasant must be in some measure a sin—that a hot bath invites cold-catching and is therefore positively dangerous, unless taken just before going to bed, or unless it is ended by a douche of cold water, or by a cold plunge. The theory that has gained currency is that the heat of the bath "opens the pores," and leads to cold-catching or some other peril, unless the "pores," are shut up by the cold dash taken at the end of the bath. So it has come to be a part of the very positive directions generally given for a warm or hot bath, especially if taken in the morning or before going out into the weather, that the end event of it shall be this same cold dash.

Some have sought to explain all the effects of baths by their influence upon the circulation. Cold contracts the surface capillaries which drive the blood within, to be followed by dilatation of them in the reaction. Warmth, as of a hot bath, dilates the outer capillaries with, it is said, too much loss of heat from the body unless cold is finally applied to contract them—an assumption that is wholly gratuitous.

These theories take no account of the effect of the bath upon the nervous system, which effect is probably the largest factor in the influence they have on most people. There is reason to doubt the great benefit of much bathing, except to satisfy the demands of our æsthetic conscience. Dirty people, and those who bathe their bodies once a week, or

month or year, succeed in living about as long, and keep about as healthy as those clean ones who wash their bodies every day. No amount of common dirt piled upon the skin in the ordinary vicissitudes of life can stop the pores against the slightest force of perspiration ; the sweat lifts the dirt as easily as sprouting beans lift themselves into the air. But the nervous effect of the bath is doubtless real and often very beneficial, while it is at times positively harmful. The shock of the bath probably has an invigorating effect on many patients, but only if the reaction comes. It is an effect upon the nervous system chiefly, and perhaps helps the recuperative processes of the sick, although just how much might be impossible to demonstrate. But there is no proof that a hot, quick bath, without a cold douche, is not followed by as good and as useful a reaction as a cold one, and there is abundant proof that it is so followed.

The chilliness and other results of a failure of reaction after the cold bath are harmful in several ways, and especially so to an invalid. To him the cold bath unduly, unnecessarily, and, I believe, injuriously, over-taxes his heat-making power in the morning, when it is all needed for the day's work, and there is no proof that it has any other countervailing benefit.

In cold weather, and especially if (as is generally the case) the patient has a cold room in which to dress in the morning, he shivers from intropulsion of blood, and is uncomfortable during this process ; a cold bath without reaction mischievously adds to his annoyance. If the discomfort were the only effect, it could be ignored as a matter of feeling ; but a common and a worse consequence is catarrh of the stomach and bowels, resulting in slow digestion of the breakfast, if not of all the meals, and often in diarrhœa and so-called dumb ague, with numerous other discomforts of several sorts. Acid fermentation occurs with flatulence and eructations. The food is less relished, and this of itself retards

digestion. The best digestion is possible only when the eating is thoroughly enjoyed. A well man may, but a sick man rarely does, enjoy his breakfast when he is shivering with cold.

The best morning bath, for both sick and well, is a hot one, taken preferably rather quickly, much as many Japanese people take their baths. Managed in this way, it does not cause cold-catching, but rather prevents it—indeed it is next to impossible for one to take cold from it. It is not merely comforting to take, it is positively delightful to most persons at any and all seasons of the year, and it starts one off to his breakfast and the day's work with the buoyancy and dash of the best reaction from the cold bath. It is not debilitating, either directly as shown by subjective sensations, or indirectly through indigestion, or any other fault of function; and this is a statement that cannot be made of the cold bath. The hot bath adds to the heat of the body, it may even slightly increase the temperature for the moment, and so prevents the sense of chilliness and discomfort of dressing in a cold room.

The best way to take the hot bath is with any kind of a tub, with say a foot depth of water at 104 to 108° F., the bather sitting down in it and abluting himself completely, and finishing the bath in five minutes. There is no harm, however, in remaining in the water ten or fifteen minutes, even lying down in it; but many people will believe there is danger in this last variation, and will hesitate to indulge in it.

To one who has known, as I have, of hundreds of people taking the hot bath, many hundreds of times in the aggregate, mostly in the early morning, and without the slightest discoverable harm of any shade in any case, it is strange that a popular prejudice against it should ever have come among our people; certainly there is no experimental ground for it, and so it must rest on theoretical considerations pure and simple. The experience and habits of other peoples are directly against such a prejudice.

Against this prejudice also is the fact that, taking the hot morning bath, patients with tuberculosis and other lowering diseases, as well as the rheumatoid affections, are generally much benefited, at least, that is the testimony of most of them, and this is borne out by all the appearances of their cases. Patients with migraines, neuralgias, so-called rheumatic gout and nervous debility, and who have tried unavailingly to improve on cold baths, have found immediate, albeit moderate, benefit from the daily hot morning bath. And the good effects have continued with the use of the bath through the months.

For safety and comfort, then, for freedom from disagreeable symptoms that may, or may not, be harmful, for certain positive benefits that cold baths usually fail to give, the hot morning bath is to be commended with great confidence as a daily resource and a daily joy. The cold bath is useful chiefly for those who least need the invigorating effects of any bath, that is, the well and hearty people. The hot bath here described is valuable, and most valuable for the great mass of our population who are below their physiological par, and who need every influence that can increase their strength and resisting power. Many of these half invalids and invalids by the cold baths are now, with true heroism, daily subjecting themselves to shivering discomfort, often lasting for hours, and with no benefit, or worse than none, solely because of a false notion derived from the partial experiences of the strong. It is a shameful waste of courage and power in a good cause. The worst griefs in life are those that are preventable, and the cold bath martyrdom is uncalled for.

LIGHT—RADIANT ENERGY.

BY W. D. ROBINSON, M.D.

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In presenting this short paper it has been my thought to consider only, and in but a cursory way, the physical side of light phenomena, as taught by modern scientists.

It is by the aid of scientific research only that we learn how this energy produces its results, and with this knowledge our application of the energy in the therapeutic work is made simple. The therapeutic use of radiant energy during the past decade has been forging into prominence with increasing force, year by year, to an extent outrivalling any other of the more modern methods of disease treatment. By light—therapeutically considered—is meant the entire extent of radiant energy known to exist far beyond the limit of recognition by the human optic nerve range of perception. Marconi electric waves, which travel at the same speed as light, 184,000 miles per second, are about 600 feet apart from top of one wave to top of the next. Bose, of Calcutta, has produced electric waves about one-tenth of an inch in length; electric waves of all intervening lengths are known to exist. A gap still exists between the shortest electric waves and the longest heat waves, which is, however, gradually being filled up by scientific research, so that now the shortest known electric waves are much nearer the longest heat waves than they are to the longest electric waves. Passing this gap, the series of waves is unbroken from the longest heat waves, measuring 70,000 $\mu\mu$, or $\frac{1}{357}$ inch, to the shortest

known ultra-violet light wave. The lightest atom, that of hydrogen, is taken as the unit base with which to compare the atoms of all other matter. To-day there is believed to exist a similar natural unit of electricity named an electron. When X-rays are being produced each minute particle of matter, or component part of matter, as ultimately may be proven to be the case, flying through a Crookes' tube, is known to bear a high electric charge; a magnet will draw these particles from the straight course as if they were minute bits of iron. It is proven that each one of these particles, named corpuscles, carries the same charge of electricity, or else is the same amount of electricity. An electron is only known by its inseparable association with something which has mass and weight; that is matter, the corpuscle. Corpuscles are known by the identical properties by which electrified bodies are known, something surrounded by or charged with an electron. Matter and electricity seem truly to be one and the same.

In this modern view the atom of chemistry is an aggregation of these electrified corpuscles, or, as it may be, the units of electricity. This ultimate unit of electricity, or, if there is a corpuscle carrying it, the electricity and its inseparable corpuscle carrier, become the unit of primal matter, of which every form of every substance known to exist in all the realms of limitless expanse, in all its forms, gas, liquid or solid, is composed. That there is in all space a something which is given the name of ether is accepted as proven. By the recognition of this has science been able to explain phenomena and facts known to exist. Many wonderful and profound theories of what this ether is, of what composed, how constructed, how behaved and how influenced, have been offered for the consideration of scientists, but as yet none have proven by tests to be worthy of general acceptance. This ether surely exists, but is an unknown mystery.

Whetham ends his modern, comprehensive and learned essay on ether with the words: "An ultimate explanation of the simplest fact about ether remains apparently for ever unattainable. Nevertheless, this all-pervading ether has to be dealt with from the centre of our earth to its periphery, and with everything solid, liquid and gaseous, within, on and about it, to the outer edge of the earth's atmosphere, and on through space to and through all expanse of space to every sun, moon and star, with all maintaining the same relationship."

A molecule is the smallest divisible particle of matter in combination, a further division separating it into its atomic constituents. A molecule is probably the one-hundredth millionth of an inch in diameter. As all matter, save the ultimate elements, consists of structures of masses of molecules, the physical effect of any agent administered for the cure of disease must depend on its power to destroy the disease-producing molecules. This it does by tearing asunder its atoms, or producing new chemic conditions in which the molecules cannot exist. Light is produced by undulations or waves in the everywhere existing ether of space. So-called white or colourless light within the limits of the conception of the human eye consists of the sum of the complete series of waves varying in length from 33,000 to 60,000 per inch, these being the two extremes of wave length.

When visible, light is separated into its component colours. These are sequently red; the longest, orange, yellow, green; blue and violet, the shortest. Light waves, shortening in length in progressive order beyond the violet, called chemical waves, are those with which we have most to deal. These, of course, are not visible to the human eye. The micro-micron is the name given to the unit used in measuring waves of light. This unit is about one twenty-five millionth of an inch in length. The dullest visible red rays are 810 of these micro-microns long, and the dullest

visible violet 380, approximately half as long as the red. In the ultra-violet, rays have been detected but one-fourth as long as the shortest visible rays. Very, very far beyond this ultra-violet region probably lie the X-rays and many other rays, the effects of which can surely be demonstrated while the rays themselves have not as yet been shown. Such rays are almost inconceivably short. The tiny grains called cathode rays are thrown off from all highly heated or electrified bodies, such as the sun, electric light, &c. These tiny grains bombard space, and all matter of all kinds existing in the expanse of all space, that is, the universal ether, in inconceivably great numbers, and at a speed of one-half to one-third as great as light, 50,000 to 100,000 miles in a second. The impact of these cathode rays, when they strike other substances, gives rise to all sorts of agitations, producing, among other results, X-rays. When these tiny grains are made to strike against certain chemical substances, an effect called fluorescence is produced. It is by the aid of this fluorescence that we are able to see through non-transparent matter, even in great masses. Fluorescence is so named from having been first studied in fluorspar. It depends on the power of some substances to absorb light energy of a one-wave length, and to give it out in a greater wave length ; thus the very rapid, short, beyond ultra-violet, waves, may be converted into the slow, longer visible rays.

Tungstate of calcium, cyanide of platinum and barium and silicate of zinc are most used as a means of transforming X-rays into visible rays. Human blood contains a fluorescent substance named animal quinioden. Cleaves believes that in this animal quinioden is to be found the keynote of the response of the living organism to the action of radiant energy. In a malaria-poisoned man, animal quinioden is absent, but when sufficient quinine, which has fluorescent property, has been administered, the malarial parasite dis-

appears. The theory is that in the destruction of the bacteria the short high frequency waves of the ultra-violet region so far agitate and interfere with their normal habit and environments that they become exhausted and die. There is no bacterial species which can resist the power of light, if the light is intense enough, short-waved enough, sufficiently concentrated and exposed for sufficient time. An exception to this is when every other condition is made most favourable for their growth.

Radiant energy affects living protoplasm in increasing intensity, in even proportion with the decreasing length of the waves. One of the modern theories of radiant energy is that it is the expression of different stresses sent through ether. Woodruff says: "These waves, or transmitted stresses, are likened to the stress on an upright bar of iron produced when a weight is placed on it, it instantly transmits the stress to the base on which it rests without moving it, and although we know as little about the nature of gravitation and this stress as we do of ether stress, yet we cannot deny either. Many short high frequency waves pass through the interstices existing between the atoms in molecules without striking at all, or even through the molecules, when in the large masses which form the substances we deal with in every-day life. It is, however, the rays that do strike atoms in attempting to pass through with which we have especially to deal in the treatment of diseases. At present the use of this energy has to be guided by the results of experiments which have been reached by simple theories.

When the time shall have come when we certainly know more, physically and mathematically, about molecules and their constituent atoms, we then can deal with radiant energy and its application with clear-sighted accuracy. In this some progress has been made empirically.

Before it was known how to make X-rays of shorter

length than those at present used, much greater superficial destruction of tissue occurred on prolonged exposures. When the molecules of germ life or neoplasms are not destroyed by the direct effect of the bombardment they must be secondarily destroyed by the rays producing other chemic forms, which, in turn, act on the original structure. Nitrogen-containing compounds are the most unstable and nitrogen is the base of protoplasm; this is especially true in the structure of disease substances. So we must expect in living protoplasm, when its molecules are made to move faster by the bombardment of waves of radiant energy, that stimulation must at first ensue. If, however, the abnormally rapid motion is continued, exhaustion and death must result; and if still continued, a breaking apart of the constituent atoms must eventually occur. Protoplasm of living tissues in natural reverse of the foregoing is reduced in structural stability and its *en masse* functionating power by a reduction of Nature's intended amount of radiant energy stimulation. It is well here to remember that the amount of light energy common to the inside of the average dwelling-house is but one four hundredth part of that just outside it in the open. By focus concentration the time required to kill micro-organisms by light energy may be reduced from so many hours to an equal number of minutes. Normal blue and violet light enfeeble and diminish the virulence of pathogenic organisms, but do not kill them. Cleaves believes that the "most important factor in the human organism is to be found in the effect of light energy on the nutritive tissue of bacteriological growths, *pari passu* with its physiological action upon the entire blood stream. This action is caused by the light energy increasing the amount of oxygen in the blood, which experimental data show to be so prejudicial to the life of micro-organisms. From a chemical point of view, to which, however, many modern scientists take exception, the bactericidal power of

light is a phenomena of oxidation, the presence of oxygen being absolutely essential. To-day all matter, organic and inorganic, is believed to be in a state of continual motion as regards its molecular anatomic structure, heat increasing and absence of heat decreasing this. It ceases at absolute zero, which is 273° C. below freezing point. The motion is vibratory and depends, so far as its changes are concerned, upon the vibrations in the radiant energy acting upon the body, of which the molecules are the constituents. When the vibrations are of sufficiently high frequency, we have learned that the molecules break down into similar forms, one of the atoms receiving sufficient vibratory energy to vibrate beyond the adhesive force holding the atoms together to form the molecule, thus destroying the integrity of the molecule. The more complex the molecule the lower is the frequency of vibrations necessary to produce such result. It has only been possible, in the limits of this paper, to superficially touch on the many interesting varieties and details to the effects of radiant energy. Sun baths, electric baths, incandescent light baths, concentrated solar energy, concentrated electric arc-light energy, blue light energy, ultra-violet light energy, vacuum tube discharges, X-rays, radium emanations, and various other rays, are the forms of radiant energy of therapeutic import. With a full understanding and control and proper means of appliance and universal application of radiant energy, the reduction of disease and death, and incidentally the prolongation of life, would seem to promise to be of an extent truly marvellous.

All this brings us to the recognition of the fact that the study of climate is practically the study of radiant energy and those inseparably associated conditions or states which it influences and which influence it.

Radiant energy is the basal essential and should be considered as seriously and accurately in studying the climate of

a specific location as the rapidly advancing scientific knowledge and means of chemic and mechanical precision shall make possible.

Advance enough in the possibilities of accuracy in securing such data now exists as to enable us to make most important deductions had we at hand such records in conjunction with those of the other recorded climatic phenomena, such as health and disease records, and those of barometric pressure, moisture, sunlight, temperature, and the presence of disease-producing animal life, micro-organisms, &c.

In a given location records of the hours of sunlight is a gross way of stating its radiant energy.

Most simple methods of chemistry will give us the refined value of these hours of sunlight. Comparison on this base can then be made with other localities covering like time and number of sunlight hours.

In illustration I might speak of an ore-yielding metal, the refined metal representing the radiant energy, and the remaining portions of the ore, which have elements of more or less value, representing, as it were, the moisture, altitude, soil quality, deterrents, &c., of climate.

Could we have presented to this Association an accumulation of the physical exhibit of the bacteria inhibiting and bactericidal records and induced chemic action of the various climatic resorts represented by the *personnel* of our membership, I cannot but feel that it would be a start of a work which would lead to knowledge of the greatest value. The point of this paper is for the establishment of records on some such lines as indicated.

Many most excellent works, exhaustive to the extent of our present knowledge, on radiant energy, are readily obtainable under the authorship of Cleaves, Snyder, Woodruff, Finsen, Cowen, Whetham, Wood, and papers of many writers in the medical and scientific periodicals, to all of which I acknowledge indebtedness.

CLIMATE IN RELATION TO DISORDERS OF METABOLISM AND THE CIRCULATION.

BY BOARDMAN REED, M.D.

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CLIMATES, in the recent past, have been studied chiefly with regard to their effect upon tuberculous disease of the lungs. Their influence on the digestion, the metabolic processes, the heart and blood-vessel system generally, and on the kidneys and excretion through the other emunctories, has been much less considered.

So much stress has been laid upon the influence of climate in tuberculosis, that the laity and some members of the profession seem to have become imbued with the idea that no other form of treatment is necessary in that disease, and also that climatic treatment is of little use in non-tubercular affections.

In consequence of these impressions numerous tuberculous patients seek health resorts without definite instructions as to any special *regimen* or line of treatment to be followed ; but, possessed of the false and dangerous notion that the air being all the remedy they need, they should avoid physicians and drugs, except the quack nostrums, which, in their ignorance, they deem safer than what they call "doctor's medicine"; and many victims of other chronic diseases, which would be helped by a change of climate, are not advised to avail themselves of this useful adjuvant even when they could well afford it.

It may be worth while, therefore, to call attention briefly to the following points :—

(1) A favourable climate, though important, is not so indispensable to the cure of pulmonary tuberculosis as is the maintenance of the circulation and of the blood-making and excretory organs in a state of the highest efficiency, together with full feeding, so that the nutrition may be improved to the utmost extent possible.

(2) Climatic conditions may affect markedly not only the heart and circulation, but also the functional work of the blood-making and depurating organs either favourably or unfavourably, *e.g.* : (*a*) Altitude, by its effect especially on the circulation and nervous system ; (*b*) temperature, by its effect on the circulation, appetite, digestion, hepatic function, and excretion through the skin and other emunctories ; (*c*) humidity, by its influence on excretion, especially through the skin, besides the tendency of excessive humidity combined with even a moderately low temperature to produce catarrhal inflammations of the mucous membranes, both of the respiratory and gastro-intestinal tract ; (*d*) the relative purity of the air, including the proportion of oxygen and carbonic dioxide and the degree of contamination by various injurious gases, as well as by dust and pathogenic germs, this climatic factor affecting powerfully the health in well-known ways as regards the blood-making processes in particular ; (*e*) the amount of sunshine, by the stimulant action of the sun's rays upon various functions—directly upon those of the nervous system and indirectly upon others ; (*f*) wind, by its action upon excretion through the skin, kidneys and lungs ; (*g*) the drinking water, by stimulating and often irritating the excretory organs, as well as other tissues in some cases, by its contained mineral ingredients, to say nothing of the organic impurities and other poisons that may be present in it.

(3) A suitable change of climate can accomplish as much

for many disorders of metabolism and the resulting diseases of the heart, arteries, kidneys and skin, as it can for tuberculosis.

(4) In ordering a change of climate for tuberculosis we should not overlook the probable influence of the proposed new environment upon the digestive, metabolic and excretory functions, since without a high degree of efficiency on the part of these, no consumptive ever gets well.

Most of the foregoing statements do not call for argument; they are self-evident. The evidence in support of the others is largely derived from the observations of the writer and of many practitioners who have had a still larger experience.

That even the best climates alone, without attention to the usual means of maintaining the highest possible nutrition, fail to cure numerous cases of tuberculosis that might recover with such help, will not be questioned by any competent authority.

Marked as is the favourable influence of certain climatic conditions in promoting recovery from both tuberculosis and many of the other diseases already mentioned, it is indisputable that they play a less important part in the care of most of them than does the best treatment by employing, in so far as needed, all the means at our command, including diet and the appropriate mechanical measures, such as rest or exercise, or both of these properly dosed and regulated, hydriatic procedures, and often electricity and massage in the metabolic faults especially. Yet it must be premised that the treatment needs to be carried out in a reasonably pure air, and never, if it can be avoided, in a large city or town. No patient can ever make the best progress in an atmosphere which is badly contaminated by the emanations of crowds of men or animals, or by any other noxious effluvia.

It is common knowledge that high altitudes exaggerate heart troubles. It is equally true, though less generally

known, that they, in some not fully understood manner, affect injuriously the nervous system of some patients, and indirectly impair their sleep, digestion and metabolism, thus lowering their nutrition. Any patient so affected at the higher elevations, whether or nor infected with tuberculosis, will do better on a lower level. Again, a moderately cold air as well as one containing the normal proportion of oxygen with an unusually small percentage of carbonic dioxide and other impurities—such an air as is found in both sparsely inhabited mountain and sea-shore resorts—tends to stimulate the appetite and digestion. So does sunshine, unless accompanied by an enervating degree of heat.

On the other hand, when the cardiac force is weak and the arterioles are contracted by the products of a perverted metabolism, thus increasing the work of the enfeebled heart, cold aggravates the condition, while warmth of the air tends to overcome it and improve the circulation, thus promoting the metabolism and helping the nutrition.

It follows that while otherwise healthy persons affected with tuberculosis may do best in dry and cold mountain climates, provided they will stay out of doors in spite of the cold, cardiac and nephritic patients, as well as many nervous ones, even when tuberculous also, will progress more favourably nearer the sea-level, and in such a warm and comparatively dry climate as that in parts of Southern California.

The more chronic dyspeptics, as well as the aged, have generally a perverted or defective metabolism, and as a necessary consequence their hearts, arteries and kidneys, are open to suspicion, if not already clearly diseased to some extent. Such patients will generally thrive best in a dry and moderately warm climate at not too high an altitude, where they can comfortably spend nearly all their time in the open air. Under these conditions, with in addition a moderate amount of outdoor exercise, a suitable diet and an otherwise appro-

priate treatment addressed to the cause of the dyspepsia—its underlying pathologic lesion—even the worst dyspeptics often apparently recover and live out their expectancy.

Old persons, whether they have serious organic faults or only the slow degenerative changes inseparable from advanced age, require nearly always a mild climate, and preferably a warm dry one at not too high an elevation, if they are to be comfortable and live as long as possible.

The milder dyspeptic and hepatic cases without senile changes or faults in the circulation or kidneys, may doubtless respond as well or better to the stimulating effect of the dry, cold air of our elevated Western plateaus, provided always they are hardy or determined enough to live there out in the open a large part of the time.

THE APICAL OUTLINE AS AN AID TO DIAGNOSIS IN PULMONARY TUBERCULOSIS.

BY CHARLES L. MINOR, M.D.
ASHEVILLE, N.C.

DESPITE the fact that everything that can add to our certainty in making a diagnosis of pulmonary tuberculosis should be welcomed by the profession and used by all men, and especially those interested in pulmonary work, many measures of undoubted value are unfortunatetly neglected, not so much because the profession doubts their utility, as on account of that inertia which tends to prevent change, or because the doctor grudges the extra time demanded.

Thus it is that, for example, the cyrtometer has found such limited use, simple as is the apparatus, and, coming to the subject of my paper, it is probably for the same reason that the careful outlining of the pulmonary apices and bases has in this country been so little used. Taught and practised for years by the careful clinicians of Germany, dwelt on by Von Ziemssen in his small but classic article, "On the Diagnosis of Tuberculosis," and later by Krönig* with even more emphasis in his well-known article, it is yet undeniable that the majority of American practitioners have not given the method attention, or used it systematically in their routine work. Here let me say that only by the systematic and routine use of any diagnostic method can we arrive at a satisfactory

* Krönig, "Z. Topog. d. lungenspitzen u. ihrer Percuss.," *B. klin. W.*, 1889, No. 37; *ibid.*, 1900, No. 20.

judgment of its value, and only by such use derive from it all the aid it is capable of giving, and that no one should take up any method unless he is willing to give it at least a few months' trial in his daily work. At the end of that time, by an examination of his case records and by a general survey of his experience, he can probably decide upon its value or worthlessness, but never after a few spasmodic trials in isolated cases. My short paper to-day, then, is written to present my experiences with the diagnostic value of outlining the apices in pulmonary tuberculosis, and is the result of its regular use for the past six or more years in all of my cases, and I trust that it may cause those of you who have not hitherto given this method a fair trial to adopt it in your work. Let me here say that it seems to me a regrettable tendency in the literature of our profession to attach to diagnostic methods or to symptoms the names of individuals. "The apical outline" is self-explanatory, whereas "Krönig's sign" is not. Moreover, Krönig, however excellent his work, was not the first to call attention to the subject, although he laid more stress upon it than others. The medical man's memory has enough to carry, without having to remember the names of men connected with a hundred and one methods and symptoms ; it needs a distinct effort to attach the thing to the name, whereas a self-explanatory name demands no such effort at all. The pathological fact on which the value of this diagnostic method depends is the well-known tendency to shrinkage of the apex of the lung, and, indeed, of the lung as a whole, when a tuberculous process is present in it ; this occurs not alone from fibroid formation in the apex, but even before such fibrosis occurs, through lessened function in the apex, or secondarily, from such lessened function in other parts of the lung, or from fibrosis, causing a general retraction of all its borders. Where the shrinkage is due to fibrosis alone the diagnostic value of its determination would be much less, as only when

the process had advanced far enough for fibrosis to manifest itself could it be of use; but resulting also, as it does, from the lessened function which comes on very early in the disease, it becomes a valuable early sign. Taking up, first, the technique, I have found in my experience that in mapping out apex lines the little finger used as a pleximeter will enable one more closely to mark out the borders than the other fingers. A pleximeter other than the finger I have never used. The percussion stroke here, more than in any other percussion, needs to be very carefully and correctly delivered, the most vertical elastic stroke possible, generally lightly given, giving the most accurate results.

The patient should sit erect, or stand, directly facing or backing the examiner according as he is to outline the anterior or posterior borders, in either case care being taken that the head is held exactly in the antero-posterior plane, for if turned to either side the tension of the neck muscles can alter the note. In my experience the anterior outlines can be best obtained from the front, save where the supra-clavicular fossæ are very deep, which can prevent the proper placing of the finger, but in case of doubt, we should also percuss from above and behind. Percussion for the anterior inner line should start well up on the neck, above the lung border, and come slowly downward till pulmonary resonance is found, when the inner border of the pleximeter finger should be indicated by a dot of the blue pencil. Repeating this from behind forward we get a series of dots, which we unite with a line. The outer border should be approached from the acromio-clavicular joint, and marked in the same way. In percussing out the posterior lines it is wise not to see the upper ends of the anterior lines, as this may affect one's judgment, while the fact that the upper ends of the anterior and posterior lines coincide accurately at the trapezius border when run independently, adds to our assurance of the correctness of the results. The

outlines according to Krönig, as quoted by Fraenkel* are as follows : "The highest level of the apex is behind, at the level of the first dorsal spine, its distance from the middle line is 5 to 6 cm. (2 to 2·4 in.), from the highest point the posterior inner border converges in a line convex to the spinal column, to the level of the lower border of the second dorsal vertebra and from thence runs downward parallel to, and 1 cm. from, the spines." The posterior external border is not given by Fraenkel. I would refer to my determination of it later. "The anterior external border runs from a little outside the middle of the anterior border of the trapezius rather steeply downward, to intersect the clavicle at the juncture of its middle and outer one-thirds. The anterior internal border starts 4 cm. internal to the external border on the free edge of the trapezius and runs from here to the sterno-clavicular joint."

My personal experience largely but not entirely agrees with this. Owing to the very various inclination of the outline from shoulder to neck, in different people at times very steep, at times much less so, the distance at the top between the outer and inner lines varies even in healthy lungs, and cannot be stated to be 4 cm. (1·6 in.), but varies from 1·5 in. to 2 in. Again, I have found the highest level of the apex to lie as often on a level between the first dorsal and seventh cervical spines as at the level of the first dorsal. The posterior external line I have found to run from the middle of the length of the spine of the scapula rather steeply upward and inward with its concavity outward to a point 1½ in. to 2 in. from the highest point of the inner line. The anterior inner lines are generally concave inward above, slightly convex inward below, the lower end being not at, but a little external

* Fraenkel, "Path. und Therap. Lungenkrankheiten." Berlin, 1904, pp. 724-5.

to, the sterno-clavicular joint, the exact location of this point not being very accurately determinable owing to the nearness of the trachea and of the large sterno-clavicular joint. The anterior outer line is steeper than the inner and concave outward, the lower end ending as Krönig notes, very regularly at the junction of the outer one-third and inner two-thirds of the clavicle (see diagrams). So much for the course of the normal lines. In early tuberculosis, especially of the apex, but also of lower portions of the lung, careful percussion will generally demonstrate a displacement of the inner lines outward and of the outer lines inward. I have found the inner line, both anteriorly and posteriorly, is apt to be the earliest affected, which, when we remember that incipient lesions are apt to be towards the inner border of the lungs,* seems natural. The posterior inner line changes only in its upper two-thirds. The dislocation inward of the outer borders generally occur later, and a change of both the inner and outer lines is generally less common than of the inner or outer alone. In early cases the lines do not approximate at the top, but join their fellows from the rear, but in older cases, with marked shrinkage, they often run to an apex, before they reach the trapezius border, forming an acute inverted V above the clavicle.

The diagnostic value of these outlines in early cases, and to some extent their prognostic value in later ones, I have found great. Not, of course, alone, for no sign unsupported by others has great value, but in combination with others, such a dislocation occurring in a dubious case will often serve to clinch a diagnosis. A slight inward alteration of a line anteriorly and posteriorly, carefully verified, will raise to a far higher value otherwise ambiguous auscultatory signs. Outward dislocation, I have found, both not so early as a general thing, and not quite so easy to determine, but

* Fowler and Goodlee.

if certainly demonstrated it has equal value. Dislocation, without marked flattening or hollowing of the supra-clavicular fossa, would seem to depend on lessening of volume from lessened function, while that accompanied by such hollowing or flattening would point to the existence of fibrosis; but this, which seems to me a reasonable assumption, could only be proven by many *post-mortem* examinations in incipient cases. Bilateral dislocation speaks almost certainly for a fairly advanced process or else for an old burned out one with much fibrosis, and since the signs of an arrested process by auscultation are often equivocal, the determination of such an alteration can be of great value. Here I would note that the assertion of Von Ziemssen quoted by Fraenkel,* that apical shrinkage can be entirely obliterated by compensatory emphysema, which according to Fraenkel was denied by Ostreich, I have found to be true repeatedly, nothing being commoner in an incipient case recovering than to see such disclocations gradually disappear at the same time that we note the filling out of a flattened or hollowed supra-clavicular fossa, such as we are all familiar with, or a return to more normal resonance due to compensatory emphysema. It will also often give very early warning of the involvement of the hitherto uninvolved apex. In drawing a prognosis also, we can at times derive aid from a study of the apical outline, chiefly from such re-expansions as I have here just dwelt on. Also when early in a case before fibrosis could be expected, we note rapid and marked shrinkage, it speaks for a notable effect on the functioning of the lung and hence a bad process. Again, it can aid us as a proof of active fibrosis when the dislocation is accompanied by marked slowly advancing hollowing of the supra-clavicular fossa. I have large numbers of case records, which will bear out the statements I have

* *Ibid.*, p. 725.

made, but I only exhibit to you to-day on the wall, tracings taken directly from the human body, to show what I have found to be the standard outline and the commonest dislocations. Some of us here, I know, are using this method regularly, and, if what I have reported of my experiences will lead any of the rest to make a fair trial of it in their work, I shall be amply satisfied, feeling sure that if fairly tested it will not again be given up.

DISCUSSION.

J. H. PRATT (Boston): My attention was first called to Krönig's isthmus by Dr. Minor. During the past year I have demonstrated the importance of determining its width and contour in a large number of cases. Narrowing of this apical isthmus of resonance often occurs remarkably early in pulmonary tuberculosis. Although this valuable sign was clearly described by Krönig seventeen years ago, it has attracted little attention and has found its way into but few text-books. A very light percussion stroke should be used in outlining the apical isthmus. Even if the boundaries of the entire isthmus are not determined, one should not neglect to measure the width of resonance just above the clavicles. The first change in the apical outline is usually a narrowing of the resonant area above the inner half of the clavicle. In fat individuals light percussion over the inferior part of the supra-clavicular fossa yields trustworthy results, because little fat is deposited here, while the accumulated fat on the top of the shoulder and in the supra-spinous fossa frequently renders accurate outlining of the entire isthmus impossible.

Dr. A. D. BLACKADER (Montreal): I put a great deal of importance upon the variation and the amount of difference I get with full expansion. I regard this point as very important.

Dr. S. G. BONNEY (Denver, Colorado): The method that Dr. Minor has suggested is of considerable value, but I feel that it has its limitations. I am convinced that errors of diagnosis in the past have not resulted so much from our lack of modern facilities, as from our failure to apply and utilise old and comparatively easy methods of diagnosis. While it is true that shrinkage of an apex may be due to other than fibrosis, the fact remains that the shrinkage in the majority of cases is due to fibrosis from a pre-existing tubercular infection. In such cases the detection of shrinkage at the apex could not be regarded as an indication of a recent existing tubercular process. It is reasonable to expect in nearly all cases of early apical tuberculosis other signs indicative of its presence than merely shrinkage. I have observed quite a number of patients who have been sent to Colorado with the diagnosis of tuberculosis at one apex, and upon examination found

only a shrinkage of lung due to a pre-existing tubercular process ; but upon the other side, without shrinkage, an active existing tubercular infection, as evidenced by moist râles at the end of inspiration following the cough. This leads me to appreciate how easy it may be for one, searching for shrinkage, to find it at one apex, and at the same time lose sight of evidences of recent catarrhal infection in other places.

Dr. J. H. PRYOR (Buffalo) : Of course, Dr. Minor fully intended that the so-called Krönig's sign should be interpreted with reference to other evidences of disease. This method of studying the position of the tip of the apex is particularly important from the standpoint mentioned by Dr. Bonney. We find quite frequently that the invasion of one apex has been preceded by involvement of the other, which may have occurred months or years before. It requires considerable expert ability to outline the apex by percussion, and the average physician will experience much difficulty in acquiring accuracy. At times the percussion sounds will prove very misleading or inexplicable, no matter how careful the examination. It is sometimes impossible to decide whether retraction, consolidation or fibrosis is present. Among the associated signs the transmission of the whisper is one of the most reliable and delicate. Perhaps it is not employed as often as its significance would seem to demand.

Dr. C. L. MINOR (Asheville) : I would, indeed, regret if, as Dr. Bonney suggests, my advocacy of the use of this method of diagnosis would tempt any man to neglect the other regular steps of an examination, but I cannot believe that any competent and careful worker would be so tempted. As to the possibility of being misled into failing to recognise the difference between an old healed apex and a new commencing trouble, had the doctor used this method, he would realise that this need never occur. On the side where the old trouble had existed he would find a concave supra-clavicular fossa and a marked bilateral contraction of both borders of the apex with, generally, dulness on percussion ; on the side of the new trouble the supra-clavicular fossa would be only slightly flattened or convex, and there would be a slight, yet perfectly determinable, dislocation of one border, or possibly two, on delicate percussion, while the percussion note over the apex would be hyper-resonant, or only slightly short, not markedly dull. As to the correctness of my statement that before fibrosis occurs the existence of the trouble in the lung will cause a functional shrinkage of that lung, I need only refer the doctor to La Grange, "Medication par l'Exercise" ; or to Campbell, "Respiratory Gymnastics"; or to Tissier, on the same subject, in "The System of Physiologic Therapeutics," edited by Cohen. They have dwelt upon the wonderful power of the lung to functionally decrease under such conditions. As to Dr. Blackader's question, I would say that whereas for some time I noted the motion of the pulmonary apex, as well as of the base, as advised by Ziemssen, I failed to find the results of the apex motion to be as valuable as those of base motion and have given it up for some time, the marking out of the outlines of the apex at the base being a different matter.

THE IMPORTANCE OF "SPLITTER" OR SUPPOSED DEVELOPMENTAL FORM OF BACILLI AS AN AID TO THE MICROSCOPICAL DIAGNOSIS OF SOME OBSCURE CASES OF PULMONARY TUBERCULOSIS.

BY F. M. POTTENGER, A.M., M.D.
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Diagnosis is not only the key to a rational therapy, but in communicable diseases it is an essential to prophylaxis. Not only diagnosis, but early diagnosis is desirable, and in many instances imperative.

In the early diagnosis of tuberculosis lies our greatest hope of cure, as can be demonstrated by statistics from any well-regulated sanatorium.

While the curing of the disease in itself is of most importance to the individual afflicted, the removal of the danger of scattering infection is of greater import to the community as a whole. Every case of tuberculosis cured removes one focus of danger and prevents the possibility of future infection.

The prevention of the spread of the disease being of such paramount importance, it is necessary that every person suffering from tuberculosis should be cognisant of the fact and be instructed as to how its spread may be prevented.

There is a natural hesitancy upon the part of many members of the medical profession in telling patients that they have tuberculosis. This should be overcome. It is unjust to the patient; it is associated with danger to the

community, and it lowers the standing of the medical profession with the community. Followed to its ultimate analysis, withholding the diagnosis of tuberculosis from the patient is nothing more or less than homicide. It takes away the chance of cure from the patient, and at the same time leaves him in a state of ignorance which endangers the lives of those who associate with him, or who must occupy his apartments after him. Before the discovery of the fact that tuberculosis is a communicable disease there was more reason for keeping the diagnosis secret, and before its curability was established it was a serious thing to tell an individual that he had tuberculosis, for it meant the pronouncing of his death sentence. But to-day, the withholding of this information pronounces the death sentence not only upon the afflicted, but also, it may be, upon some of his friends and dear ones.

We must not expect to diagnose incipient pulmonary tuberculosis by the microscope, for this is a condition in which the microscopic findings will be negative so often that they cannot be relied upon. The diagnosis of incipient pulmonary tuberculosis is largely a matter of physical examination together with clinical history. While we have the tuberculin test to aid us where the microscopic findings are negative, yet it must be the physical examination and clinical history which suggests the necessity of a tuberculin test. The microscope is relied upon entirely too much, and very few men will stand for their diagnosis against its findings. This is absurd, because a moment's thought will show that infection can be present without ulceration. In the larynx, where we can study the progress of infection from day to day, we often find a tuberculous process running for months without ulceration occurring. We know, too, that many cases of pulmonary tuberculosis run for months without showing bacilli.

This shows us the importance of perfecting our means of diagnosis and familiarising ourselves with every method which will help to establish the presence or absence of tuberculosis.

In this communication I wish to mention a class of cases which usually puzzle the examiner, and describe a somewhat new method of establishing the diagnosis.

It is not infrequent that an individual presents himself giving a history typical of tuberculosis, who, upon physical examination, shows signs which are almost unmistakable. The examiner satisfies himself that tuberculosis is present. Upon microscopical examination no bacilli are found. Further examinations of sputum also prove to be negative. Unless the examiner uses the tuberculin test, he is most likely to doubt his diagnosis and try to explain the signs and symptoms in some other way.

Many of these cases show what are called, in the scant German literature pertaining to them, "splitter," * † ‡ which means "fragments." Splitter appear under the microscope as small round bodies, and look as though they might be cross sections through the body of a bacillus. They take the stain the same as the tubercle bacillus.

These have been mistaken for precipitated stain; but after one has had them once pointed out to him, he will see that they are quite different. They are always round. Sometimes they appear single, other times in clumps. Sometimes they are accompanied by tubercle bacilli, but very often nothing but splitter will be found.

They seem to be a developmental form of tubercle bacilli and are found in individuals who show resistance to the disease. They are of low virulence and show a reduced ability to develop. If inoculated on a good culture medium, they will develop into bacilli. Inoculated into guinea-pigs

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* C. Spengler, "Ueber das Kochische T. R. und Tuberkelbacillen Splitter," *Wien med. Woch.*, 1902, Nr. 14.

† C. Spengler, "Ueber Splittersputa Tuberkuloser," *Zeit f. Hygien*, Bd. xlix.

‡ Niessen, *Wien med. Woch.*, 1902, Nrs. 5, 30 and 31.

they may not cause infection, owing to their low virulence. They are easily destroyed by chemicals, much easier than bacilli. Thus it will be seen that they show none of the characteristics of spores.

I wish to report a few cases illustrating the manner in which the finding of splitter has confirmed the diagnosis of tuberculosis made on physical examination, in the absence of bacilli.

Case 1.—Mrs. F. had been suffering from a general run-down condition for two years; tired easily, so that she was no longer able to do her accustomed duties; lost some weight; had a cough which was accompanied by the expectoration of a quarter of an ounce of muco-purulent sputum per day; had slight rise of temperature, 99° to 99·5°. Patient had been examined by many able European clinicians. All found evidence of tuberculosis in the right upper lobe, but when the microscope failed to reveal bacilli, they backed down in their diagnosis.

Sputum examined for splitter revealed their presence. Patient was put upon tuberculin treatment, and reaction was obtained, confirming the diagnosis.

Case 2.—Mrs. E. B., aged 28, had been complaining of being tired, loss of appetite, loss of weight, for one year. Cough and expectoration and pain in the throat for seven months. Examination of chest revealed infiltration at both apices with evidence of cavity at right apex. Moderate dulness to the third rib on right side, and second rib on the left. Examination of throat revealed the epiglottis ulcerated, the entire left half having been eaten away. The left arytenoid was also ulcerated and there was a great thickening of the adjacent parts.

Tubercle bacilli had never been found in the expectoration, although the case had been considered as tubercular, and had received treatment for same. Examination for splitter revealed

their presence, and after treatment with tuberculin a few bacilli were found at one examination only.

CASE 3.—Mr. H. D. S. had been ill for nearly four years. Began with tuberculosis of the spine, which developed an abscess eighteen months previous, for which the patient was operated. After operation the patient felt tired and lost much strength, and was unable to do his accustomed duties. Repeated examinations had revealed quite severe physical signs on left side of chest, consisting of harsh inspiration, prolonged expiration with large mucous râles; dulness on percussion, extending to the base. Bacilli had never been found, although repeated examinations had been made. Examination for splitter revealed their presence. Patient reacted to tuberculin. He developed a bronchial fistula which ruptured through the chest wall, in the pus of which both splitter and bacilli were found.

CASE 4.—Mrs. C. Z. had never been very strong. Had been complaining for two years of a general run-down condition. At the time of the beginning of her failing health she had an operation, at which time one ovary was removed, which proved to be tuberculous. The patient had a slight cough with very slight symptoms of roughness at right apex. Bacilli not found. Examination for splitter revealed their presence.

CASE 5.—Mrs. A. F., after an attack of *la grippe*, began to run down, with loss of weight and appetite. Complained of being tired, and of a hacking cough accompanied by expectoration, which would continue during the winter and stop during the summer. Examination revealed moderate infiltration of the entire right lung and upper lobe of left. Dulness in the entire area, quite marked over the right upper lobe. Symptoms of cavity at right apex. Repeated examinations by different physicians had failed to show bacilli, hence diagnosis of tuberculosis was not made. Examination for

splitter revealed the same present. Patient reacted to tuberculin.

CASE 6.—Mrs. D. B. suffered from pleurisy ten years ago. Has had fair health since until the last two years, during which time she had lost in weight, suffered from fatigue, and for the past six months has had a hacking cough with some expectoration. Upon physical examination there was moderate infiltration of both upper and lower lobes, with slight dulness to the second rib on left side and moderate dulness to the third rib on right side. She had been examined by several good physicians, who had suspected tuberculosis, but the diagnosis was changed on account of failure to find bacilli. Examination for splitter showed their presence. Tuberculin test also positive.

DISCUSSION.

Dr. E. R. BALDWIN (Saranac Lake): I do not know of any observations of mine that would confirm Dr. Pottenger's statements of the presence of fragments of bacilli in tuberculous sputum, and diagnosing them as such, without the bacillus being present. It would always be necessary to produce the disease by inoculation in a guinea-pig. For myself, I should insist on the inoculation disease in the guinea-pig before accepting the microscopic findings.

Dr. F. M. POTTENGER (Los Angeles): This work has been done by Carl Spengler, of Davos, Switzerland, Niessen, and others. I have started some experiments, and thought I would have them ready for this meeting, but through some delay they were not completed. I have been assured, however, by a number of men that splitter are of value in making a diagnosis of tuberculosis. I know in my own cases that in none of them were bacilli found until they were put on treatment, then by repeated examinations the bacilli were finally found.

THE CONSIDERATION OF THE TEMPERAMENT OF THE INDIVIDUAL A NECESSARY FACTOR IN LOCATING A CONSUMPTIVE.

BY WM. C. GLASGOW.

ST. LOUIS.

In former days, when a person with tuberculosis consulted a physician, the general advice was, "Go west and rough it," or, "Go to Texas, to North Carolina, to the Adirondacks, to California," according to the fad of the day, or according to the information held by the physician, derived from returning tourists, magazine articles, or railroad folders. The knowledge of the physician was limited and his advice was utterly unsatisfactory. The unfortunate one was simply turned loose, to work out his own salvation as best he could. The sad experience resulting from this advice convinced us that we should acquire more knowledge of the places to which we sent our patients, and guide them to places which seemed to be better fitted for their sojourn. As we grew in knowledge we began to realise that certain climates were better fitted for certain classes of the tuberculous, and we recognised the fact that different stages and forms of the disease required different climatic conditions. We also realised that some cases were unfitted for any climatic change, and that these would be better at home.

This knowledge was until the last few years rather hazy, but thanks to the work largely of the members of this Association, it is becoming more and more definite and exact, and

to-day we send our patients away from home to suitable climates, with such instructions as experience has taught us, to promote as far as possible the arrest of the disease. In selecting special climates for special cases we are guided largely by the pathological conditions existing, and look upon the patient more as a pathological specimen than as an individual. We may have selected the ideal climate for a special case of disease, but we may find that in spite of our perfect surroundings of sunlight, air, altitude and humidity, our patient will weaken and fail to improve; in fact, he may steadily grow worse. This shows us that sunlight, altitude, &c., are not the only essentials necessary for him; that there is something else besides the pathological condition to be considered, and this other thing may be the most important of all.

Certain cases of tuberculosis improve in every climate, and certain cases grow worse and die, in spite of our best efforts. There is no specific climate for the tuberculous. There are gentlemen in this Association coming from every climate in this country, and I am sure that they will certify to about the same general results with regard to the improvement and arrest of the disease in their different localities. I would ask them whether there is not, in many cases, an individual element which either favours or retards the desired improvement. This individual element I will call the temperament of the individual, and it is to this that I would call attention to-day.

The influence of mental conditions on vital processes, and the effect of disturbed vaso-motor action in influencing various organic secretions, are now fully accepted by the medical profession. That the depressing emotions exercise a most injurious effect on the nutrition of the body, if continued for a length of time, and have a tendency to produce degeneration and disease, can no longer be denied. This

is especially true of the digestive function, with the processes of metabolism and assimilation. Deranged gastric, hepatic and intestinal secretion leads to a lower degree of nutrition, and surely impairs the vitality of the body. As tuberculosis is a disease of malnutrition, and the whole aim of our present-day treatment consists in correcting and improving this lowered nutrition, anything which will interfere with this will most certainly prove a hindrance to recovery.

The natural weakness of the disease is increased by the presence of depressing influences, and this may nullify our best efforts. Worry and depression of spirits, home-sickness and melancholy are often factors to be met with, and these vary according to the individual and circumstances, largely according to the temperament of the individual. Men vary in disposition, some are sanguine, optimistic, self-reliant; others depressed and easily discouraged; some are nervous and impressionable; others phlegmatic and philosophical; some have no self-reliance, and are dependent on family ties for happiness and contentment; then, again, we meet with men of determination and force of will, others who are weak and spineless.

With the optimistic we have great latitude of choice, and send them where you will, they will find a congenial place. Some are veritable Mark Tapley's; inconvenience and discomforts find no place in their vocabularies. Give them good food and they will find amusements and occupations. With the second class we have the most trouble. They are generally hopeful at first, but this soon wears off, and we find worry and dissatisfaction taking its place. They wish to make constant changes, and make the rounds of various health resorts. They need to be amused and occupied, and it is a great mistake to place them where they have nothing to occupy their minds except the symptoms of their own disease. They watch the symptoms, and they constantly compare their

symptoms with those of others. This self-inspection becomes a habit, and if there is no improvement—as is most likely under such conditions—they become discouraged and melancholy. These people are not fitted for a lonely life. They need to be placed in some centre of activity, where they can see things, even if they take no part in them. As much as possible they should be kept away from other consumptives. If to this temperament be added home-sickness, they may as well return home. The influence of old associations and friends will do more for them than climate.

With the dogmatic, strong-willed individuals, we have a good deal of trouble. They are often egotistical and think they know better than their doctor. They are hard to manage, and refuse to be guided by rules and regulations, and become dissatisfied when the expected cure does not speedily take place. Success with them depends largely on the personality of the attending physician. If he is a person of a positive, forcible character, and can gain their confidence, he may influence them. If he is weak and vacillating, his influence will be *nil* and his advice disregarded.

The weak and spineless individual with no will power had better be left at home. We find this temperament often in cases of laryngeal tuberculosis. No physician in any climate wishes a patient who has lost his grip. Self-reliance is a quality, the value of which cannot be over-estimated. When we find this wanting, when we find the patient dependent on family ties for happiness and moral support, it is simply cruel to send him away by himself. Such people are not good mixers; they make no friends, and do not enter readily into the sports and amusements of others. If possible, in such a case the family itself, or at least certain members of it, must be transplanted with the sick one. This is the only chance of getting improvement.

Worry and depression will nullify the best effect of climate.

The financial problem is often a great source of worry. Some are absolutely selfish, and demand money, although the sacrifice entails privations and even bankruptcy to the other members of the family; but in the majority, the knowledge of straitened financial resources and the sacrifice being made for them causes a depressed condition of mind. Many patients are sanguine of recovery if they can only reach some promised land. Transportation is easily obtained, and with a limited amount of money, which is soon exhausted, their troubles begin. These people expect to have their disease arrested in a few months. They expect to be able to get suitable work, when we know that the labour market is overstocked already. When their money is exhausted, they simply become a burden on local charity. Our *confrères* in the health resorts fully realise these conditions, and they have often appealed to us not to send such people to them. If they are of the worrying kind, their troubles will so depress them that they steadily grow worse. The place for such people is at home. Under proper conditions and management they live longer and are more contented under home surroundings.

In offering this paper to you, I have not aimed at any scientific presentation. It is simply a sketch of a few ideas which I have gained from a long experience with consumption, and which have impressed me as being of vital importance. Of course, there are exceptions to all rules, but I am convinced that my experience will be verified by that of others who have had experience with these cases.

ÆSCULAPIAN TEMPLES OF HEALTH COMPARED WITH OUR MODERN RESORTS.

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DURING the last three or four years, I have become interested in the ancient Greek health resorts, to which my attention was attracted by the researches of Dr. Richard Caton, of Liverpool, England, who has spent a great deal of time in investigating the ruins of the Æsculapian temples, especially those at Epidauras, Athens, and Cos.

These places, called Asclepia (Greek), Æsculapiums (Latin), or Temples of Health, were under the control of the Æsclepiads, the priests of Asclepios, or Æsculapius, the mythical God of Medicine. Many of these resorts were established in various parts of Greece. A. C. Merriam, in 1885, stated that at least three hundred and twenty were known to have existed. Every town of any size had its Temples of Health near by, and to these places the people flocked from all parts of Greece, and even beyond her borders.

At ordinary times, the frequenters of these temples were mostly invalids; but when festivals in honour of the god were held, multitudes of pleasure seekers came from far and near, to attend the solemn feasts, witness the theatrical shows and games, and enjoy the other unusual attractions. Even in ordinary times, many persons went to these temples for amusement or for rest in a healthy locality, precisely as

they do to health resorts in modern times; and many others accompanied relatives and friends among the patients. Sick persons made pilgrimages to the Asclepia, just as they do at the present day to Lourdes, Ste. Anne de Beaupré, and other noted places, expecting to be supernaturally healed. In fact, the ancient Asclepions were like our health and pleasure resorts of the present time in many respects. Nevertheless, they were primarily intended for the sick, being dedicated to Æsculapius and intended as a part of his worship. The music, architecture, paintings, statuary, theatricals, and games, however, served to attract the richer element among the Greeks—the same class sought for by the proprietors of our resorts of the present day. The religious services, also, impressed those that could be reached in that way—those who needed the "suggestion cure."

The Asclepia consisted of a single building or a group of buildings, situated in a supposedly healthful region. The location was not, however, always so salubrious as it was thought to be, the Temple of Epidaurus, for instance, being situated seven miles from the sea, in a rather damp valley, surrounded by mountains, and five hundred feet above the sea-level. A spring—usually a mineral spring—was commonly found at or near the temple grounds; and there was almost always a grove of deciduous and evergreen trees. The elevation of the Asclepion at Athens was about three hundred feet; that of Cos, three hundred and twenty. Peireus was also near the sea-level. These resorts were usually very dry during most of the year. Athens was three miles from the sea; Pergamos, twenty; Delphi, eight. Cos and Rhodes were located on islands; the former, on an island of the same name. Cnidus was near the Sea of Asia Minor, not far from the Island of Coan.

Epidaurus was properly the most fashionable resort, one that attracted the wealthy—a Newport or a Bar Harbour. "In

the year 292 B.C., this historic temple was visited by the Roman Embassy as the most noted place of the kind in the world. In 167 B.C., L. Emilius Paulus visited Epidaurus, and found that it was rich through the numerous gifts that had been bestowed by those that had been benefited by a residence there. One hundred and fifty years later, most of these riches had quietly disappeared—probably by theft." Riches sometimes disappear from our modern sanatoria; see the losses of actresses and others so frequently paraded in the public press. Five centuries later, Passanius found it in a flourishing condition. In his description of the Epidaurian Oracle as he found it, he says: "The most important building was the Temple. The oracle was an abode of the god. The Temple stood in the centre of the Sacred Grove. No births or deaths were allowed in this grove." These Greeks seem to have had the same aversion to deaths in their neighbourhood as is shown by our modern landlords in similar resorts, where they take dead bodies out through the back door after midnight, or ask the dying to leave because "the air is too strong for them." The ancient town of Epidaurus is now called Pidhavro.

Dr. T. Smith Sozinsky, a graduate of the University of Pennsylvania, in his valuable and interesting work on Medical Symbology, thus describes the Sacred Grove: "Proceeding in a south-westerly direction from the site of the town of Epidaurus, we come, after a journey of about five miles, to the location of the famous Epidaurian Oracle of Æsculapius. It is a little vale, bordered almost all around with shrubbery-clad hills, notable among which are Mounts Titthium, Cynortium, and Coryphæus—the first and the second to the north, and the third to the south-east.

"At a little distance down it, flowing westerly, and emptying into the River Lesca, is a rivulet formed by two main branches, one of which springs from about Mount Coryphæus

and traverses the Sacred Grove. To this grove the name Hierum is applied." This place, in its glory, was as full of life as a country fair. "It is less than a mile in circumference. Within it are found the remains of most of the structures it formerly contained. In the centre stood the Temple, or Sanctuary, of Æsculapius; in the south-east, at the foot of Mount Coryphæus, the theatre, which afforded accommodation for twelve thousand people, and which is one of the finest ruins of ancient Greek buildings." Passanius and Lake say it is within the Sacred Grove, and Ludlow states that it is on the outside. It was used for foot-races, chariot-races, and music. "South-west of the Temple was the place devoted to athletic games, the Stadium, to the north of which were the Cirtrum and the Photus, or circular cell about twenty feet in circumference, which contained the paintings and other works of art, and probably served as a place of reunion for the officials of the Sanctuary and for certain sacrifices and ceremonies." There was also a library and a large art-collection. Later on, a small theatre was erected, probably intended for music, gorgeous processions, and religious pageants. All these attractions were, no doubt, intended to entertain and amuse those able to receive the benefit of them. Therefore, we see that the plan of the promoters of amusement and health resorts was much the same then as now.

The most important building was the Temple, the abode of the god and his oracle. Upon it was the wonderful statue formed of ivory and gold, made by Thrasymedes of Pamo. The god of medicine, our father Æsculapius, seated on a throne, was represented as rather advanced in life, but of attractive appearance. He had long hair and a long beard, looking very like some of our modern advertisers. He held a staff in his left hand, the right resting on a serpent; and a dog was at his feet. There were also other buildings, gymnasia and dormitories, in the neighbourhood.

None of the other Asclepia approached Epidaurus in either size or celebrity, although Cos had both a distinguished school of medicine and a successful temple. Pliny wrote of it as being flourishing and powerful in the highest degree. Cnidus, a rival of Cos, was also well patronised.

The Æsclepiads, or priests, in whose charge these resorts were, claimed to be the descendants or followers of medicine in that day. They were the educated, and regular, or orthodox, physicians. They acted in the dual *rôle* of ecclesiastic and practitioner of medicine, but the latter half of their occupation had the greatest prominence. They believed that the healing art was a gift from the gods and consecrated to them ; hence, that it was a divine art.

These priestly physicians were good pronosticators ; for they were close investigators of the phenomena of disease, and careful observers of their patients' symptoms. Mr. Lesha says : " They were equally dexterous as priests and as physicians, providing themselves with resources in either capacity, which they could turn to the benefit of the patients' infirmities and their own profit." They were bound by an oath—either the Asclepiad oath or the Hippocratic oath—binding them to secrecy, charity, obedience, sincerity, and morality, an oath that might be used in obligating physicians at the present day.

In this connection, I may state that the Greeks were by no means the first to become versed in the laws of health. The Hindoos were much more enlightened in regard to medicine than we have been led to suppose. It seems quite probable that the Arabs carried the medical lore of the Hindoostanees to Egypt, and that the Greeks received it from the Egyptians. It is known that Hippocrates went to Egypt in his early life, and after his return began his medical writings. Perhaps the Father of Medicine did not deserve all the credit he has received in the past, as being the originator of the science of medicine, and the first to describe diseases in writing.

Again, we find that Inhotep, who lived 3500 B.C., the great Egyptian physician, knew much that has been buried until lately, when it was unearthed by investigators. All this makes us feel that, as the Dutchman said, "the longer on a man lifs, the more on he finds out." Hippocrates certainly used the information derived from the practice at Cos in his writings, but much that he wrote was greatly antedated by the writings of the Hindoos and the Egyptians.

Cnidus and Cos were probably the most scientific and advanced of all the health resorts of Greece, both being medical schools. The most celebrated of the medical schools were at Cos, Cnidus, Pireas, and Rhodes; but the greatest was probably that at Cos, owing to the fact that its destinies were presided over by Hippocrates.

The so-called Father of Medicine was born on the island of Cos in the year 460 B.C., and was said to be descended from Æsculapius in the fifteenth generation. Podolirius was his progenitor. He was an Asclepiad, but he seems to have been the one to break one of the Asclepiads' oaths; for in his writings he divulged the secrets of medicine to the world. It was at Cos that Hippocrates was a teacher, and it was at that place that he studied the histories of the patients. These histories constituted largely the foundation of his writings; for he used them to illustrate his works practically, as well as in teaching the students clinically. Cos was an off-shoot from Epidaurus.

Herodicus, who was the preceptor of Hippocrates, was the first to recognise the use of gymnastics in the treatment of disease; but Hippocrates was the first to practically adopt this method of treatment, and in his hands it became a very important remedy. Gymnasia had been extensively used in Greece. By this methodical physical training of the Greeks a race was developed that had the most vigorous and hardiest soldiers; and the perfect forms arising therefrom gave the

models to Phidias and Praxiteles, from which they evolved those marble statues that still delight and entrance the world.

Dr. Rudolph Herzog, of Tubingen, about two years ago, brought to light the ruins of the Temple of Cos; and Dr. Richard Caton, of Liverpool, afterwards lectured on this health temple, giving the following description of it.

It is located two miles back from the sea, on rising ground, and three hundred and twenty feet above the sea-level. Back of it, the mountains rise to a height of 2,800 feet. The air is mild and salubrious. Much havoc has been wrought in the ruins of the Temple by earthquakes, and by the stealing of material for churches and mosques and to make lime. Dr. Caton has made a study of the ruins of the different buildings, and in his lecture describes their uses.

The Asclepion at Peireus, in Thessaly, was presided over by the two medical sons of Æsculapius, Machaon and Popolirius, and was probably originated by them. Homer states that they were the priestly attendants there. This temple was placed in a remarkably healthful location, and was in such competent hands that it became a very successful and popular resort.

The practitioners at Cnidus paid particular attention to individual cases, and avoided, as far as possible, powerful cathartics, bleeding, and active medication.

Every disease was probably treated at these resorts; but no obstetrical cases were allowed on the premises, and no disease that was obviously about to terminate fatally was permitted to enter.

In answer to my enquiry in regard to advertising, and whether greater advantages were promised than could be given to the patients, Dr. Caton said: "The priests asserted that the god could cure anything; but it was understood that he did not always do so."

In regard to fees, everyone was expected to give according to his means. Voluntary offerings of jewels enriched the priests. These were expected, and the poor were liable to fare badly. The walls of the Temple of Epidaurus, Cos, and Peireus were covered with votive tablets, giving an account of the cases and the miraculous cures. In the temples were offerings consecrated to the gods, and models in gold of deformed limbs that had been cured or benefited by treatment. It is asserted that these valuable models have been sold again and again to new patients. The persons seeking succour were allowed to read the tablets containing the histories of persons that had been afflicted in the same way as themselves, and had been cured by the treatment in the temple. The method of treatment was more like that in a modern dispensary than like that in a hospital; for the cases were usually of the walking, or ambulatory, type. In later times, as may be learned from the writings of Hippocrates, genuine medical treatment evolved from this earlier method. All persons seeking succour from the god were expected to pass at least one night in the temple.

Upon arriving at the Asclepion, the devotee was purified or cleansed by a bath, made aseptic, and administered at the portal. This bath was followed by inunctions and frictions, and by the drinking of fomentations and decoctions or herbs. A lecture on the rules and regulations of the temple followed. Prayers and other religious services, accompanied with music, were then held. An animal was sacrificed upon an altar, in the presence of the patient, who was sometimes wrapped in the fresh skin and told to go to sleep and dream, the dream being supposed to give a clue to the treatment suited to the particular case. It may be interesting at this point to state that Dais, the wife of Osiron, indicated appropriate remedies for diseases in dreams.

At first, the patient was made to fast; but later, he was

permitted to eat the meat of the animals sacrificed with such imposing ceremonies. Convalescents were provided with stone seats out of doors. The seats had high backs, thus enabling the invalids to sit facing the sun in the open air, and, at the same time, to be protected from the wind. These seats are still in existence.

In regard to the efficacy of these measures, Dr. Caton says: "In early times, they (the priests) told huge lies about wonderful cures, and advertised them largely. Probably many hypochondriacs and hysterical persons were 'cured' by impressions on their imaginations; and many other cases, of a more genuine order, were benefited by the pure air, the rest the simple food, the baths and water-drinking, the massage and the physical exercise, as well as by the therapeutic influence of mere change."

Aside from the effect of imagination, the essentials of the treatment in these temples included :—

(1) *Climate.*—Change of air, scene, food and mode of living, new associations, agreeable society and surroundings, all tending to banish unhealthy habits and melancholy; strength would return, sickness be forgotten and women left behind under the delightful surroundings.

(2) *Sun-baths.*—Open houses, roofed and walled in only by the horizon, forming merely a shelter from bad weather—the same, to all intents and purposes, as our "sun-parlours," or the popular "open-air" treatment of the present day.

(3) Well-regulated *exercise*, modified by the conditions of the patient—passive or active, driving, riding, walking and running. We have now substituted golfing and croquet for walking and dancing, lawn-tennis and baseball for running, as well as archery, swinging, Punch and Judy shows, &c. most of which keep the patients in the open air.

(4) *Gymnastics.* — Our ancient brethren were acquainted with the value of gymnastics. Herodicus (400 B.C.) probably

introduced them into medicine. He it was who modified the heavy exercises of the youthful warriors and adapted them to the use of the weak and the diseased. Then men were trained to wear heavy armour, to throw huge javelins, and other heavy athletic exercises. Herodicus employed lighter exercise, such as walking, vociferation and holding the breath, as light medicinal exercises. Hippocrates used the same exercises in the Temple at Cos.

(5) Inspiring hope in the dejected, causing despondency to disappear, and in its place hopeful cheerfulness.

(6) Ruling and regulating the food and rest. The food was simple, wholesome and nutritious.

(7) Diversion for the mind. Beautiful art, architecture, pleasing landscapes, &c., to distract the mind from bodily infirmities or imaginary woes.

(8) The beneficent, quieting effect of religious thoughts.

(9) Superstitious influences, engendering hope, fear and mystery.

(10) A simple life in a place that was secluded from the outside world, and freedom from family and business cares.

(11) Dr. Caton says that snakes were employed to lick the sores of patients. These serpents were not venomous, being of a harmless species. They belong to the same family as one of the common black snakes of America called the "racer," the Colubar constrictor. The Æsculapian snake was the Elaphis, or Colubar Æsculapii. They had in the health temple the real thing; we have the imaginary kind.

(12) *Massage.*—This was used in certain cases. Dr. Caton tells me that the inscriptions so state.

(13) *Baths and Water-drinking.*—The first procedure was to cleanse the patient by a good and thorough bath at the portals of the temple. This might be imitated by our modern sanatoria without injury to their usefulness.

The free use of water of all kinds might represent modern

hydrotherapy; the massage, osteopathy. The treatment of the mind was sometimes like the present-day faith cure, Christian science, and other fashionable medical cults.

All that can be said in conclusion is that the difference between the treatment of patients followed by the Asclepiads in their temples and that pursued in our modern health resorts is that they had control of the patient and his surroundings in all cases; while, with us, the sojourner at a health resort is usually under no control. The patients do as they please, and then often find fault with the management, the air, the water, or some other condition; when the real cause of the failure are the late and irregular hours, drinking, gambling, eating too much, and disproportionate exercise. The Asclepiads could command the obedience of the patients to their rules and hygienic regulations. Then Grecian health temples were the forerunners of our modern sanatoria, hospitals and medical schools.

The medical treatment at the temples was well up to the times, as shown by what I have already said in speaking of the Cnidian Temple, where attention was paid to particular cases. This would seem to indicate that the priests did not always pursue a routine practice, as is the case in many of our modern sanatoria.

In conclusion, allow me to state that, after due investigation, it is my humble opinion that we of this enlightened age have much to learn in the proper management of our health and pleasure resorts from our ancient Greek medical brethren. With the lesson learned from our ancient brethren we might make our twentieth century resorts much more helpful to the sojourners within their gates, but such a condition of affairs need not be expected while commercialism plays such an important *rôle* in our sanatoria.

THE CARE OF FAR-ADVANCED CASES OF PULMONARY TUBERCULOSIS.

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MODERN opinion regarding the rational management of consumption relates to the consideration of a suitable *régime*, embracing rest, outdoor air, and super-alimentation. If these principles are worthy of detailed application for incipient pulmonary invalids, it must follow that still more completely ought they to be elaborated with reference to far-advanced cases. The object of this paper is to call attention to the manner and extent of their application to a class of consumptives demanding upon the merits of their condition the fullest conception of an intelligent system of management. Among invalids of this character the most rigid and painstaking observance of basic principles of treatment, subject only to modification according to peculiar individual needs, offers the sole reasonable hope of a successful issue.

It is unnecessary at this time to discuss the accepted favourable influence of climate, although an important aid even to advanced cases. It is also inexpedient to consider the alleged advantage of residence within a closed sanatorium, although the utility of complete supervisory control either within or without an institution is thoroughly recognised.

With the exception of fever, which constitutes one of the features of special prognostic and therapeutic importance, it is not proposed to discuss the various means of combating

special symptoms, as these are too well understood to justify repetition.

I wish to call attention in the order named (1) to the attitude of the physician in assuming the responsible direction of the patient; (2) to the necessity for energy, infinite patience and regard for the smallest detail in the protracted period of observation; (3) fresh air and rest combined; (4) principles of diet; (5) the management of fever.

The first great requisite for successful treatment consists not only in the careful preliminary investigation of all the phases of the case, physical, symptomatic and historical, but also in the diligent study of all the factors pertaining to the patient himself, temperamental, financial, domestic and social. Only through such means may the clinician hope to arrive at definitely correct conclusions as to the manner of applying the principles of treatment to the best possible advantage. With a clear comprehension of the many problems incident to the peculiar requirements of the patient, he should venture no expression of opinion before securing their accurate solution.

Following a review of the clinical history and careful examination of the chest, it is my practice to make a brief report of the condition and offer such encouragement as is consistent with the facts and seems advisable from first impressions, declining, however, to grant a detailed advisory statement until after the urine and sputum have been examined. This permits not only precise clinical information regarding some important phases of the case, but what is even more important, affords not less than twenty-four hours' delay, during which time its many aspects may be reviewed. I have found it desirable in the majority of instances to acquaint the patient and family with some intelligent conception of the nature of the disease and the manner in which it is hoped to secure arrest. It is usually well to make clear that there is no special method of treatment, that the position of the

medical attendant is one of counsellor to guard against blunders and indiscretions, and that strict compliance with instructions is a *sine qua non* to success. Thus with a more or less comprehensive understanding of the *rationale* of the methods to be advised, it is easy to conceive how much more ready is the acceptance of an enforced *régime*, how much greater confidence is established between patient and physician, and to what greater extent there may exist a mutual, sympathetic co-operation. Having thus established early relations of confidence and reciprocal effort, the physician is usually permitted with less opposition to elaborate ideas of treatment which might otherwise have been non-acceptable to patient and friends.

The second essential of treatment consists in a diligent, painstaking regard for detail, which must be inspired solely by a genuine devotion to the well-being of the patient. It is comparatively simple to prescribe rest, fresh air and plenty of good food, but the obligation of the physician is not discharged until he personally provides such accommodations and surroundings as will ensure the proper continuous execution of his directions. The vital point ever to be borne in mind is the thought that it is not the disease itself, but rather the individual offering the greater field for study and attention. The management of consumptives is radically different from that of any other class of human beings, in view of the fact that by virtue of their illness there may be, with some, more or less accentuation of inherent wayward characteristics, with others a certain perversion of natural proclivities, and possibly acquired degenerative tendencies. An attempt was made by a writer some years ago to demonstrate that pulmonary invalids, through the very nature of their disease, became perverted nervously, inculcating habits of self-indulgence, loss of self-control or moral restraint, developing an inability to appreciate the proportionate fit-

ness of things, and exhibiting the stigmata of varying degrees of degeneration. While protesting that such broad generalisations are both untrue and unfair, it must be admitted, nevertheless, that as we are all to some extent creatures of our environment, consumptives are influenced to a degree by their radically changed conditions, surroundings and prospects. The knowledge of their physical state, the separation from home, the indolent life, the absence of high ideals, the lack of healthful occupation of the mind, the association with others similarly afflicted, and, in some instances, the interminable duration of the illness, inevitably modifies character. From my own experience I can assert, however, that a considerable number of pulmonary invalids, as a direct result of the suffering, both mental and physical, are led to a life of broader charity, greater sympathy and almost angelic disposition. It remains true that consumptives constitute a class decidedly unique and peculiar to themselves, demanding of the medical attendant the exercise of the greatest tact, judgment and skill that is required in all the domain of medicine.

It unfortunately happens in many cases that it is not the patient alone whose temperamental peculiarities demand thoughtful consideration, but to a great extent the accompanying members of the family as well. While many patients have literally committed suicide through their own folly and indiscretions, others are sacrificed through the perversity, ignorance and delusions of their immediate relatives. Petting, sympathy, condolence or indulgence on the part of others constitute a most serious hindrance to the accomplishment of best results. Segregation of the patient in the majority of instances is attended with greater success than could otherwise be attained. I have several times insisted upon the separation of little children from their parents for over two years at a time, under the care of trained nurses especially

adapted to the work. While this may seem difficult of execution, I have found that if properly presented the family are usually quick to appreciate the wisdom of such advice and govern themselves accordingly.

At no age are patients more domineering, wilful and difficult of management than in the neighbourhood of eighteen, even if confined to the bed. I have found the care of such patients to be made conspicuously more simple and effective if away from their parents. The separation of husband and wife is often expedient by reason of considerations which are quickly recognised. In such instances the physician must possess the courage of his convictions sufficient to insist upon the removal of these influences through such isolation as may be reasonable and practicable.

The task of enforcing a proper *régime* varies within wide limits. It is comparatively easy to secure the active co-operation of patients who are intelligent, phlegmatic in temperament, and amenable to advice. Such a class is undoubtedly limited in the experience of those who are brought in contact with all stages and conditions of pulmonary tuberculosis. When to the care of the pulmonary invalid there are added the difficulties arising from the peculiarities and perversions of judgment of members of the family, it is easy to appreciate that successful management necessitates such a degree of patience, determination and attention to detail as to almost constitute a form of genius. The extent to which this endowment is possessed by the medical attendant is responsible in large measure for the success which may be expected to attend his efforts.

Rest and *fresh air jointly* constitute a cardinal principle of treatment applicable to advanced tuberculosis. While open air is indispensable to all stages and conditions of the disease, in desperate cases complete rest is of equal importance. Either one with the sacrifice of the other is of no value for

such a class of invalids. No matter how many the hours out of doors, if at the expense of fatigue, the day must be summed up as a failure. Exercise is absolutely forbidden, as it almost invariably increases temperature, produces exhaustion, very seriously impairs digestion, and sometimes excites hæmorrhage. The nervous force which is dissipated by even slight exercise or excitement, diminishes by just so much the energy required for the proper performance of digestion. With this function impaired and with elevated temperature, the patient inevitably loses not only valuable time in his effort to secure arrest, but in many instances a large measure of opportunity as well.

By absolute rest I refer to the maintenance of the recumbent position in bed during the twenty-four hours of the day. Rubbing, gentle massage, or resistance exercises may be employed occasionally to promote capillary dilatation, equalise the circulation, and develop the heart. Invalids may obtain fresh air at all hours, and at the same time remain completely at rest, only through special provision for porch accommodations. It is hard to conceive how the ærarium, or other device for putting the head of the patient at an open window, can be productive of the best results. While such ingenious arrangements are assuredly better than nothing, their disadvantages consist in the limited amount of fresh air capable of attainment, the obstacles in the way of special care and nursing on account of the hood arrangement, and the psychic influence, which can hardly be regarded as encouraging or inspiring.

When possible to prevent, I have never permitted my patients to occupy tents, on account of the difficulty in securing proper ventilation, with the unavoidable inconvenience and privation. No matter how modern the effort towards sufficient ventilation, they are usually cold in winter, if not overheated at the expense of fresh air, and extremely

oppressive in the summer, unless open to direct draughts. Nothing has become more impressed upon me than the necessity of rendering the pulmonary invalid comfortable, physically, and of inspiring a cheerful mental attitude through the influence of a pleasant environment. If primitive tent accommodations are good for a class of people unable to secure anything else, the commodious, specially arranged porch, opening directly from the sleeping room upon the second floor is infinitely better for others. So high a value do I place upon this arrangement that I frequently insist upon the construction under my own personal supervision of such porches, even by patients who take houses under lease. The porch should be covered by permanent roof, sheathed up from the bottom a distance of three feet, with a wide sill, and enclosed with wire screening.

It has been advised by some that patients remain directly exposed to the rays of the sun as many hours as possible regardless of the season. To this principle I am heartily opposed, as it may happen a porch comfortable in the morning becomes almost unbearable in the afternoon, and *vice versâ*. My rule is to permit the patient to remain in the direct rays of the sun only during such times as he experiences actual enjoyment from so doing, and to remove him whenever discomfort supervenes. It is not the varying degrees of heat from the sun's rays that produce beneficial results, but rather the pure, fresh air, in or out of the sun, according to the state of the patient and conditions of weather.

I am not in sympathy with the application of the theory of outdoor sleeping at night regardless of other considerations. This practice, when advised with proper discrimination, is capable of producing inestimable benefit, but its routine adoption is certainly followed in some instances by harmful results. The principle must not be forgotten that the patient must at all times be kept perfectly comfortable

as well as supplied with fresh air. In extremes of weather comfort can be secured only by lowering the canvas curtains and closing all outside apertures to such an extent as to preclude proper ventilation. In the midst of severe weather conditions, patients not only are more comfortable in a bedroom with moderate heating facilities, but at the same time are afforded much better ventilation from one or two open windows than obtained outside with all curtains tightly closed. Further, it has been my experience that certain patients have done poorly by sleeping out of doors save during the summer. The explanation is found in the varying degree of bronchial irritation co-existing with the tubercular infection. In so far as the bronchial element predominates, by just so far is the cough made more distressing and the general condition thereby less favourable through exposure to the cold air at night. During the winter months the therapeutic indication for cases of chronic bronchitis *per se* is not fresh air, but rather protection from draughts and exposure. Is it not consistent and wise to offer bronchitic patients suffering from complicating tubercular processes the same judicious consideration ? While in many cases there is no direct relation between the extent or degree of activity of the tuberculosis alone and the amount of bronchial irritation, the fact remains, that severe bronchial disturbance reacts decidedly to the disadvantage of the invalid. This is especially exhibited in the fatigue incident to the cough, and in the reflex vomiting after the ingestion of food which materially interferes with nutrition.

In view of the fact that nutrition is to a great extent the measure of Nature's constructive efforts fowards arrest, it is easy to appreciate the vast importance of *diet*. No matter how rigid the *régime* in other respects, nor to what degree the strength and energy of the invalid is conserved by judicious rest, nutrition remains largely dependent upon the ingestion

of food sufficient to supply the natural demands and aid directly in the reparative process. The first great proposition, then, is that the patient should take an extraordinary amount of food daily, in fact all that it is possible to administer within the limits of digestion and assimilation. The word "administer" is used advisedly. It is not what the patient *desires* to satisfy the cravings of hunger, it is not what he is willing to take, or even what he feels personally he is able to eat, but it is rather all that the physician and nurses are able to persuade him to ingest through their personal influence and direction. The system of super-alimentation is subject to great variation according to the individual, efforts appropriate for one case being entirely inapplicable to another. The tastes, desires, and inclinations of the patient must be considered, the variety and character of food, the manner of cooking and the style in which it is served. Digestive disturbances must be recognised and obviated, not only by medicinal measures, but also by the quantity and nature of the food and the time of its administration.

Aside from these well-recognised principles, the degree of success attained in the effort toward heroic feeding depends largely upon the personal influence of the nurse. The physician may emphasise ever so clearly the necessity of overfeeding, and the invalid in appreciation of this may recognise full well that a large measure of the responsibility rests directly upon himself, yet it may happen from various causes he is totally unable to take unaided a proper amount of food. Depression of spirits, temporary excitement or fatigue, with weakened will power, may suffice, despite his higher faculties, to render the meal a failure. It is here that the usefulness of the trained nurse is very apparent. Through the various means at her command, according to her tactful judgment and the exigencies of the case, she is able to exercise an influence which in my experience very often turns failure into

success. Her power may consist in quiet persuasion, exhortation or command, but the result is the same in either instance. My nurses are taught to employ all these measures when necessary, and that failure to enforce the ingestion of a satisfactory meal will not be overlooked save in the presence of fever, acute digestive disturbance, or other equally good and sufficient cause. A systematic endeavour is made to determine the limit of tolerance for each individual, who is subsequently compelled at any cost to consume the full quantity of food of which he is capable, not according to his own ideas, but as determined by judicious experiment and close clinical observation. It is astonishing to what a remarkable extent patients are able to ingest food, who at first protested their utter inability to take more than a modicum of nourishment. Persuasive appeals to such are usually of little value. Results are only obtained through authoritative command of the physician, supplemented by the ministrations of a nurse especially adapted to the work. I have in mind a young lady in far-advanced phthisis, who protested strongly her repugnance and intolerance for food. Under no circumstances, she declared, could she swallow a raw egg or submit to beef juice and cream. Through the firm directing influence of her nurse she has taken for many months, not only three large meals daily, but in addition fifteen raw eggs, eighteen ounces of beef juice and a pint and a half of cream, in addition to somatose and Russell's emulsion. Such a result would be impossible of attainment save for the personal influence of the nurse. The conclusion is logical, therefore, that the obligation of the physician to the patient is not met by the formal perfunctory statement that it is necessary to eat large quantities of food, nor still further by specifying the amount to be taken. His trust is not discharged until he places the patient in such an environment, and surrounds him with such influences as will secure compliance with detailed instructions.

The attainment of successful results depends not alone upon the advice received by the patient, nor entirely upon his ready acquiescence, but rather upon the fortunate acquirement of such combined conditions as will insure the actual fulfilment of dietary directions.

It is hardly necessary to specify in detail the character of the food, which is necessarily subject to much variation in individual cases, the central thought in all being to have the patient consume as much as he can assimilate. It may be well to state briefly the considerations leading to selection of diet.

The policy of overfeeding embraces a careful consideration of the food eaten during the meal and the nourishment taken at other times. The fullest measure of success can be obtained only through a special effort toward the selection of such varied articles of food as will appeal to the appetite and cater to the tastes of patients who are notoriously whimsical. Generally speaking, pulmonary invalids are encouraged to partake of a mixed and unlimited diet with instructions to use butter and cream freely. No attempt is made to restrict the character or quantity of the food unless in accordance with special indications. In the absence of conditions clearly contraindicative of heroic feeding, the patient is urged to ingest progressively increasing quantities, the urine, however, being examined at short intervals in each case. Sweets, starches and fats, including pastry, are denied to patients with diarrhœal disturbance or with other evidences of gastro-intestinal indigestion. These are also interdicted for those with pronounced uric acid diathesis, the nitrogenous foods having been found productive of less harmful results than the carbohydrates. Digestive disturbances are treated not so much by diminishing the total daily quantity of food, but rather by its judicious selection and time of administration.

As far as extra nourishment is concerned, it is desirable to

introduce as much concentrated food as is practicable with the least resulting impairment of appetite and disturbance of digestion. My practice is to administer from two to four ounces of beef juice immediately upon awakening in the morning. This enables the patient to better undergo the bath and does not interfere with the appetite for breakfast, which is served one hour later. The beef juice is repeated in the middle of the forenoon, afternoon and evening, and constitutes the only nourishment permitted between meals, as it is of small bulk and has not been found to impair the appetite for the ensuing luncheon or dinner. It has been my almost invariable experience that if considerable amounts of food in the shape of raw eggs and cream are taken between meals the subsequent appetite is to a great extent destroyed. Thus it may result that the patient is able to take in the twenty-four hours actually less food than if there had been no attempt at extra nourishment. This unfortunate result rarely occurs if the eggs and cream are taken *immediately following* the meal. It must be made clear that such extra nourishment should not be taken as a substitute for even a portion of the regular food, but should be entirely supplementary to it.

After the invalid has eaten all that he feels he can possibly engorge, it is surprising how simple is the ingestion of raw eggs and cream, and with what beneficent results, provided they are taken in the proper manner. The eggs should be uncooked and swallowed whole with a little sherry, lemon juice, or ice water. In this manner they are introduced into the stomach without any special taste and do not become repugnant to the patient already satiated by a generous meal. Difficult as the feat of taking raw eggs may be considered at first by the invalid, it speedily becomes more or less of a joke, provided the eggs are fresh. Under no circumstances are the eggs to be beaten up or mixed with the cream or milk. If incorporated into a palatable beverage they eventually become

distasteful and nauseating to the individual. If without special flavour and swallowed quickly they may be continued almost indefinitely. The average number of raw eggs consumed by my patients daily is one dozen, although many have taken from fifteen to twenty. Following the eggs half a glass of cream is immediately taken. To some somatose in teaspoonful doses is given three times a day either in soup or the beef juice. Emulsions of easily digestible fats are often taken half an hour after each meal. In most desperate cases it is my practice to take advantage of every available opportunity for the administration of nutritive enemata consisting of beef juice, a beaten egg and peptonised milk.

Alcohol, although admittedly a food, is permitted but sparingly, and then only in the presence of clear therapeutic indications. It is rarely given as a cardiac or general stimulant, save in people of advanced age. Used indiscriminately it adds to arterial excitement, increases the tendency to hæmorrhage, impairs appetite, and promotes restlessness and insomnia. The detection of its odour upon the breath, or the flushing of the face, may be regarded as direct indications of its harmful effect even in the absence of stronger evidence. When taken in sufficient quantity to destroy the appetite and retard digestion, the amount of food supplied by the alcohol is far less than the nutritive value of the food which would be ordinarily taken. To the diminished food supply occasioned by the alcohol in inordinate amounts is added the distinctly injurious effect of over-stimulation. Its intelligent administration, however, in small amounts and to carefully selected cases, may be attended with rare benefit. I sometimes permit a mild dry cocktail to be taken five or ten minutes before the mid-day or evening meal by those with fickle appetite. This should not be continued for any great length of time. If taken cold, only for such periods as advised by the physician, it may add

to the consumption of the food. A light ale, stout, half and half, taken with the meals, is of some value as an appetiser and aid to nutrition. Taken during the evening it frequently is found to promote sleep. Occasionally sherry, Rhine wine or moselle may be taken with dinner. This constitutes the only manner of administration of alcohol which I am in the habit of permitting, save in the presence of acute conditions demanding active stimulation.

Fever constitutes more substantial evidence upon which to base provisional conclusions regarding ultimate success than any other clinical feature in the course of pulmonary tuberculosis. It usually exists as an important symptom of sepsis, and represents, if persistent, an insuperable obstacle to recovery. There is no definite relation between the physical condition and the degree of septic absorption. There may exist most extensive areas of active tubercular infection without any appreciable elevation of temperature, or there may be present severe constitutional disturbance accompanying a slight inactive tuberculous process. The prime obligation of the medical attendant relates as far as possible to remedial rather than to palliative measures. No practice can be more superficial than the effort to lower temperature temporarily through medicinal or hydrotherapeutic agencies, without immediate recourse to the employment of other means tending to prevent its recurrence. Nights sweats, diarrhœa, cough, and even hæmorrhages may be treated as they arise through methods found to be productive of temporary relief, but the fever of sepsis demands far more than the employment of measures to increase the comfort of the patient. If the policy of *laissez faire* is instituted, the future contains nothing for the patient but speedy disaster. If active steps are taken to combat temperature the condition of the patient is in no wise made worse even in the event of failure, and in certain conspicuous cases practical results will be obtained far beyond the

limits of present laboratory knowledge, and incapable as yet of bacteriological explanation. This position is justified by the facts of actual experience.

The measures which I am in the habit of employing are (1) the most complete interpretation of the rest treatment, and (2) the use of the antistreptococcic serum.

Rest is the preliminary essential factor in the diminution of fever, which is often remarkable in patients kept rigidly in bed at all times. With a beginning reduction of temperature there is a corresponding improvement of appetite, digestion and assimilation, with resulting increased nutrition and greater power of resistance. While in some cases the reduction of fever is immediate (and complete) upon the adoption of the recumbent position, others exhibit at first but slight diminution, months elapsing before the temperature recedes to the neighbourhood of 100°. While the prolonged indefinite period of rest constitutes a trial to one's patience and courage, the invalid is constantly laying the foundation for an ultimate and possibly complete recession to normal.

In a paper to be read next week before the National Association for the Study and Prevention of Tuberculosis, a series of ten cases will be briefly reported, illustrative of the possibilities of success attending this procedure. Any special deviation from the strict interpretation of the principles of the rest treatment, even for a short time, is inevitably destined to result in failure. This method should be adopted as a preliminary measure in all cases presenting the septic fever of advanced tuberculosis, save in the presence of such special indications as demand prompt recourse to more radical procedures.

Whenever from the antecedent history of the case it is apparent that the continuance of the rest treatment offers no reasonable assurance of success, refusal to resort to the use of serum, even if believed of doubtful utility, is, nevertheless, a culpable negligence on the part of the physician.

While the *rationale* of its administration may be incapable of precise bacteriological demonstration, a justification for its employment is found in the occasional remarkable exhibition of clinical improvement. No medical growth can take place without recourse to investigation and experiment. Development along clinical lines is sometimes equally valuable as the results of laboratory research. It is known that in the sepsis due to streptococci, which constitutes the principal secondary infection of tuberculosis, the soluble toxins are not found present in the blood, but are enclosed within the micro-organism itself, constituting an endo-toxin. Hence a neutralisation of the toxins, as in tetanus or diphtheria, is impossible. It has been shown recently by Bordet, v. Lingelsheim and Denyes that in animals, following the administration of an antistreptococcic serum a previously existing negative chemotaxis is converted into a positive one, the repellant action between the micro-organism and the leucocytes being changed into an attraction, affording added opportunity for resulting destruction of the streptococci by the englobing and digesting of the micro-organisms. Thus far the results obtained in animal experimentation have not been found to hold true in man. This fact, however, should not be construed at present as being sufficient to preclude the administration of the serum, for the clinical evidence of its value in a class of cases appears incontrovertible.

The results of my observation following the use of the antistreptococcic serum were reported four years ago. A considerable experience since then has emphasised my conviction as to its utility in desperate cases failing to exhibit improvement through other means. While thoroughly cognisant of some of the disadvantages attending its employment, I have thus far seen no valid reason to discountenance its administration in properly selected cases.

My conclusions may be briefly summarised as follows :—

(1) About one case out of every four or five may be reasonably expected to exhibit a pronounced diminution of temperature by the end of a week or ten days.

(2) The remaining cases do not show any bad results from its employment, other than due to the occasional intolerance of the system for the serum of a horse.

(3) This so-called reaction, which is independent of the specific nature of the remedy, but common to all other serum preparations, bears no relation to the ultimate results obtained.

(4) Some cases show marked improvement in spite of temporary discomfort in the way of chills, fever, urticaria and painful swelling with stiffness of the joints, while others exhibit no improvement although there is an entire absence of constitutional disturbance.

(5) Reaction may take place within twelve hours after the use of the serum or it may be delayed for six weeks.

(6) Occasionally the improvement is delayed indefinitely until the occurrence of the reaction, following which there may be complete and enduring subsidence of the fever.

(7) As a result of the serum the temperature either may subside to normal or may be reduced several degrees, remaining, however, somewhat elevated.

(8) I have not been in favour of its continued subcutaneous employment, and have given as a rule not over four or five doses at intervals of one or two days and awaited results.

(9) During the past nine months I have practised the tentative administration of the remedy by the rectum for ten or twelve doses before resorting to its hypodermic use, in order to avoid the discomfort which sometimes follows its injection into the tissues.

(10) I have seen unquestionably good results attend its use even when streptococci were not found in the sputum, and believe that even under such conditions the clinical evidences of a persisting sepsis may sometimes afford, from a humanitarian standpoint, a warrantable basis for its use.

DISCUSSION.

Dr. Howard Anders (Philadelphia): I rise to commend this paper and am grateful to Dr. Bonney for having read it. There are two elements brought out in it that we need to-day. We ought to approach the far-advanced cases more readily and rationally from the standpoint of being able to help them; and that they should not be discarded for euthanasia. One thing has impressed me, and that is that we are becoming more and more inimical to therapeutic socialism. Our plan of treatment must be adapted to the individualisation of our patients. Such aspects as Dr. Bonney brought out as to the psychic, financial and other relations of our patients are refreshing. It will be to me a very helpful, readable, and ponderable paper; and I appreciate the importance of these things more and more. There is one thing we in Philadelphia are in need of, and have trouble in getting. In our tuberculosis service at Blockley we are handicapped because we lack sufficient attendants. We need good nurses and plenty of orderlies. It is less necessary in the incipient cases than those far advanced.

Dr. C. L. Minor (Asheville): The remarks of Dr. Bonney on the use of antistreptococcic serum in advanced cases agree entirely with my experience and I am entirely in accord with him with regard to its great value in a certain number of such cases, although I have not found it a very reliable remedy, working well in some and having no effect in others, irrespective of the bacteriological findings in the sputum. On the whole, quite a large percentage of cases of running high fever with chills and profuse expectoration and showing advanced destruction in the lungs are benefited by it. I have not seen any dangerous results (although at times the urticaria, œdema and severe joint pains are very inconvenient), and I believe that when the patient can afford it its use is indicated in such cases. I have never tried its use per rectum, but it seems to me that it would be distinctly better than its hypodermic use.

Dr. F. M. Pottenger (Los Angeles): This paper has brought forward an important point. We know that the early case is the best case for treatment, and that it gives us the most hope. We also know that it is not true that the advanced case has no hope, for if we give him the same care and guidance that we would give a case of typhoid or pneumonia, nearly every case would improve. Many will have their disease arrested, and some will be cured. If we want to get these results, "patients must have careful individual attention," as Dr. Bonney says. Our failure is due to the fact that we ourselves are often hopeless, and that we do not give the patient the comfort and cheer that he needs. We see these patients sent west with the idea that the open air alone will cure them. I see them come to Southern California; they arrive tired and worn out, and, regardless of their condition, begin sight-seeing. They start up a temperature—if it does not already exist—and in many cases start themselves on the down-

ward path. They go from one place to another because they have had no instructions. Intelligent guidance and instruction is necessary.

Between the tents and rooms, I prefer the latter, if they are properly constructed and thoroughly ventilated. We can have tents, however, which will obviate the objections made by Dr. Bonney. I have a tent-house that has three sides open; the north side is closed and used as a dressing-room. The east, south and west sides are entirely open. The curtains are hung from a plate ten inches from the roof, this ten-inch space being left for ventilation in case the curtains must be down; this latter, however, rarely occurs, perhaps not more than ten nights in a year in our section. I also desire to add my experience with antistreptococcic serum. I have used it in many cases and favour its use. In some cases I have been disappointed, but quite often have obtained results that could not be had without its administration. This valuable remedy merits a more general use. It is not a panacea, but it is along the right line.

Dr. I. H. ELLIOTT (Gravenhurst, Ontario): The paper was presented ably by Dr. Bonney. Treating the patient as well as the disease is important. The patient should not be hampered in his treatment by the excessive zeal of his friends in offering advice not given by the attending physician. As to the tents, I also think that no tent can be made to replace the proper room for the patient. There are patients who can get along in a tent better than indoors, but the average patient wants more attention than he can get here. Under certain atmospheric conditions it is difficult to keep the temperature at what is required. I have found patients who have been mistaken under the idea that cold air is pure air, struggling under five or six blankets and wondering why they are tired. As to antistreptococcic serum, I have had some experience which has shown that about one in five shows the benefit of the use of the serum. During the past year I have been giving the serum per rectum, and I do not think there is quite as much reaction in cutaneous rash and joint pains.

Dr. C. L. MINOR: I believe that a properly arranged room, with two to four windows, is as a general thing distinctly better than any tent, or even a good shack. The large majority of our patients will be absolutely unable in their future life to continue shack-living, and must, of course, use bedrooms, and a patient trained to live only in such a shack will be to a large extent unfitted for bedroom sleeping. For this reason, save in summer time, I do not think it wise to keep one's patients in shacks or tents, unless the room has too little window space or cubic contents.

Dr. J. H. PRYOR (Buffalo): How many cases of urticaria did Dr. Bonney see as a result of antistreptococcic treatment?

Dr. E. R. BALDWIN (Saranac Lake): Was the fall in temperature any more marked in cases treated with the serum than in other cases treated without it, or could it be ascribed to the serum? In two out of twelve patients in whom the same variety of serum was used by me there was improvement. but not an influence on the temperature, which was certainly attributable to the serum.

Dr. W. D. Robinson (Philadelphia): Has the serum anything to do with the tubercular poison, or is it a mixed infection?

Dr. S. G. Bonney (Denver, Colorado): It is not expedient or wise for us to attempt to decide this question as to antistreptococcic serum strictly in accordance with our present laboratory knowledge. It is well to recognise that there is something to be learned from clinical experience which affords a justification for the employment of an agent at times, although its *rationale* and utility are not demonstrated to our satisfaction from a bacteriological standpoint.

Four years ago, when I began the use of this serum, I must confess that I did so with much scepticism. I could scarcely find a warrant for using that which I felt was not based upon any authentic laboratory investigation. I first used it in the case of a lady who appeared utterly hopeless upon arrival, with most active and extensive trouble in each lung, and too ill, in fact, to be sent back home. For several weeks she remained under observation, without exhibiting the slightest improvement, and in fact appearing in almost a moribund condition upon several occasions. I even informed the family at one time that she could not live more than a few days. I will simply report that the improvement shown, following four or five doses of the serum, was almost beyond belief. She exhibited thereafter an uninterrupted and progressive gain. She gained forty-nine pounds, with entire subsidence of cough, expectoration or fever, and of moist râles in the lungs, the physical signs remaining being only those of fibrosis. She has now been away from Colorado, in an unfavourable climate, for two years, and has borne two children since she left here, and according to last advices has remained well. This certainly would seem to be quite a definite instance of its efficacy. I used it first in a series of twenty-five cases before reporting results. One of these was a case of aspiration or septic pneumonia, following a severe pulmonary hæmorrhage. Temperature was 105°, pulse 150, and respiration 50. Patient was only semi-conscious. Such cases almost invariably die. There was no sputum and no opportunity to determine whether or not the infection was distinctly streptococcic. The serum was given, nevertheless, as a "long shot," feeling that there was nothing to lose and possibly something to gain by its administration. While there was no scientific justification for its employment, its use was indicated solely upon humanitarian grounds. There was prompt and immediate remission of temperature; within twelve hours the patient recovered from his acute condition, and has since secured an entire arrest of his tubercular process.

Following these twenty-five cases, whose varying results I have reported, I became disappointed with my employment of the remedy, for a period of one or two years. I was much disturbed by the frequent urticaria and swelling of joints, and also by the fact that in many of these cases there was no improvement. I may add that I found it takes much more courage to use the remedy than not to do so. I have felt that if my conviction is

profound as to the exigency of the situation, I do not discharge my obligation to the patient by a mere perfunctory, formal expression of opinion as to the utility of the serum and the advisability of its use, but have felt compelled to use my personal influence with the family in such cases to insure their consent to its use. In some instances I have seen no improvement within six weeks, and then a most severe and acute reaction. With the subsidence of the acute symptoms incident to the reaction I have often found a complete and enduring recession of fever.

A BRIEF STUDY OF A DIPHTHERIA EPIDEMIC AT THE ADIRONDACK COTTAGE SANATORIUM FOR INCIPIENT PULMONARY TUBERCULOSIS.

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Diphtheria epidemics in institutions for the tuberculous are of unusual occurrence, and for this reason as well as for the many problems that arise under such conditions, it has been deemed of sufficient interest to report to you in more or less detail a recent diphtheria epidemic at the Adirondack Cottage Sanatorium.

The origin of the first case has never been clearly determined. We present the facts as they occurred. Early in October, 1905, one of our orderlies after a visit to his home developed a membranous tonsillitis, which on a single culture showed streptococci and no diphtheria bacilli. He was allowed accordingly after a few days' isolation to resume his duties. We might say at this point that several cultures taken from his throat at intervals later on during the epidemic, as well as those from his room-mate were always negative. In the latter part of the month one of the maids, who had but recently begun work in the laundry and who was with the orderly quite frequently, reported with a well-developed tonsillar diphtheria. She was promptly isolated in her room with her room-mate, her sister, and a strict—as we thought—quarantine established. Later we learned that standing in her

doorway, she would hold conversation with the other maids. After most rigid precautions, including negative cultures, both sisters were discharged, the latter on Saturday evening, December 30, 1905. The same day, before the first case was discharged from quarantine, a patient and one of the maids had a slight soreness of the throat and two days later when they reported that they felt bad, a second patient went to bed. The second maid, who was employed in the dining and linen rooms, was at work until she went to bed on the evening when the diagnosis was made in all three. The cases were isolated and given antitoxin at once. The next day a cottage entirely apart from the other buildings was opened as an isolation pavilion, placed in charge of a competent nurse and the cases transferred there. The same day, January 2, the throats of everyone in the institution were carefully inspected and a patient and two maids, with tonsillar membranes, were isolated. One of these was probably not diphtheria, although a positive culture was obtained at a later date. The next day, January 3, all patients and employees, irrespective of any pulmonary or other trouble, were given an immunising dose of 500 units of the antitoxin prepared by the New York State Board of Health. The two cottages and the Childs Memorial, the Infirmary, where cases of diphtheria had occurred, were isolated. Each inmate of these cottages was given 1,000 units and not allowed to leave the cottage for one week. During this week several (six) cases of follicular tonsillitis developed, which I might add caused much uneasiness, especially as one occurred in one of the infected cottages. The infirmary patients received but 500 units and one of them who had complained of sore throat developed a membrane on the posterior pillar. She was promptly transferred to the isolation cottage, but the membrane proving by culture to contain only streptococci, she was sent back to the Childs Memorial. It was with some trepidation that immunising doses were given

to five of the infirmary patients, as they were in an advanced stage and in three cases the disease was more or less acute. No more cases developed until January 16, two weeks after the first immunising dose, when one of our nurses developed a rather sharp attack of tonsillar diphtheria. The day following, January 17, the fireman, and on January 18 and 19, two patients, were attacked. On January 20, a second immunising dose of 500 units was given to all patients who had not shown especial susceptibility to the antitoxin. To these a dose of 400 units of purified antitoxin, prepared by the New York City Board of Health, was given a few days later. On January 21 it was deemed expedient to take cultures from the throat and nose of every inmate of the institution. The result was appalling, twenty-two of the patients and nine of the employees, including the chef and the baker, revealed positive cultures. The attempt at isolation of inmates with positive cultures but without clinical symptoms which had been begun was gloomily abandoned. The health authorities quarantined the institution, but strange to say, few patients became frightened. On January 24 the last case, a patient whose throat was negative at first, developed an apparent follicular tonsillitis, which was positive on culture and was isolated. A second cottage had been opened and a nurse placed in charge. A third and last immunising dose (400 units of the purified antitoxin) was given on February 3. The quarantine was raised February 20, after the last case of clinical diphtheria showed two successive negative cultures. No new patients were admitted until February 27, and since then each has been given 400 units of antitoxin on admission.

To summarise briefly, the epidemic lasted fifty-one days, *i.e.*, from January 2, when three patients became ill, to February 20, when the last patient was discharged from quarantine. Eleven cases of clinical diphtheria developed and in thirty-two other individuals diphtheria bacilli were found on

culture. There were no fatalities and no serious complications. In all, over 400 immunising doses were given to 174 individuals, 129 tuberculous and forty-five non-tuberculous.

Epidemics of diphtheria in institutions are by no means rare, but I can find no record of such an epidemic in a sanatorium for pulmonary tuberculosis, where the youngest patient was about 18. Such a condition presents many peculiar phases and problems on which we could get little or no information. In the first place, should the patients be given immunising doses of antitoxin? How often should these doses be repeated? Should cultures be taken from the throat and nose of all the patients, or only from those with clinical diphtheria? How should the treatment for the pulmonary tuberculosis be modified, if at all? Should the pulmonary tuberculosis modify the amount of antitoxin in diphtheria?

The most important point in prophylaxis is complete isolation. We feel now that had we set aside a separate cottage and placed in it the first patient under the supervision of a competent nurse, that the epidemic would have been avoided. We took every precaution, but it is difficult to impress the necessity of complete isolation upon many persons, not only those of low intelligence. For this reason a nurse is a *sine quâ non*. The most careful quarantine was established as soon as the epidemic broke out. No measures were omitted. Every room was carefully fumigated with formaldehyde and completely renovated, and each of the cottages where diphtheria occurred was scrubbed down with corrosive sublimate, revarnished and retinted.

Immunising Injections.

All inmates received two or three immunising doses of antitoxin. The doses were at first 500 and later 400 units.

Form of Antitoxin.—A small amount of antitoxin prepared by Parke, Davis and Co. was used, but the greater part was from the New York State and City Health Departments.

Site.—The injections were made for the most part midway between the scapula and the spines of the eighth and ninth dorsal vertebræ. Many of the women preferred the injection in the arm, but the local reactions were much more severe in this region.

Preparation.—The preparation of the skin can be made very simply. It was cleaned with absorbent cotton, usually first with soap and water, then always and in some cases only with alcohol and the site of injection closed with collodion. The most convenient syringe we found to be the small "Sub-Q" glass syringe with an asbestos-wrapped glass plunger, holding about 2 cc. Small needles were used and the whole syringe frequently boiled, while after each injection they were rinsed out with boiling water.

Results.—In no case did any infection occur. In four instances diphtheria developed between the fourteenth and sixteenth day following the first injection and in one case four days and in another one day after the second injection. It was therefore deemed advisable when only 500 units were used to repeat the injection for two or three times at intervals of two weeks.

The purified antitoxin produced much fewer unpleasant symptoms than the other varieties, which in many instances produced general malaise, more or less rash, swelling of the face, hands and feet, pain in the joints (so severe in two cases as to cause insomnia and to require morphine), stiffness of the joints, nausea and vomiting, as well as in nearly every case more or less local tenderness and slight swelling for a few hours.

The injections were usually made in the forenoon and the malaise when present usually occurred within twenty-four hours. The majority of the patients suffered some slight inconvenience, but in most cases it was of no moment. In some patients it was postponed for eight to fourteen days and occurred simultaneously with the rash.

The accompanying tables give full details in regard to the rash, which occurred more in women than in men, and less in the tuberculous than in the non-tuberculous. Of 140 cases 32 (23 per cent.) had some rash. In 16 cases the rash was severe. The usual form of rash was urticaria, but fine pin-point papules were present in some cases, more often at the site of the injection. A few acne-like papules occurred in a few cases, chiefly on the face, and in women. In 2 patients who had previously suffered from purpura a crop of purpuric blotches appeared after the injections. No rash occurred after the first or second injections in 92 patients. In 9 it occurred only on the first, in 6 only on the second, and in 4 only after the third immunising dose. From this it would appear that the rash is as likely to occur after the first as after the second or third injections. Of 10 non-tuberculous individuals the rash appeared on the seventh day in 5, once each on the first, second, eighth and thirteenth days. Among 29 tuberculous cases the rash appeared as follows: Second day, 2; fourth, 3; fifth, 1; seventh, 3; eighth, 5; tenth, 5; fourteenth and seventeenth, 1 each. The rash, therefore, occurred most frequently between the seventh and tenth days, but may occur as early as the first and as late as the seventeenth day after injection.

The pulse was quickened in several patients. One suffered from palpitation, in another an intermitting pulse was present. The temperature was raised in 13 patients, and possibly more would have shown this symptom had careful records been kept of each patient. In no instance was the temperature raised for more than a few days. In 3 patients who were in bed on account of elevated temperature the injections produced no noticeable effect on the temperature than to raise it a fraction of a degree for a few hours. Stiffness in the joints of the hands, knees, and, in several instances, in the hips, was present. Associated often with the

stiffness, and possibly its cause in some instances, was swelling of the face, hands and feet. In many cases the swelling was more or less localised in the arm or leg where the injection was made. Marked swelling occurred, in all, in 13 cases.

TABLE NO. 1.

Diphtheria Antitoxin and Rashes.

Results O=No rash X=Rash P D=Parke Davis S=State P=Park	Tuberculous cases	Non-tuberculous cases	Total cases	Groups: Tuberculous cases	Groups: Non-tuberculous cases	Groups: Total cases	—
S large doses O ...	2	2	4	2	2	4	No rash.
Therapeutic X ...	7	3	10	7	3	10	Rash.
Three doses—							
S O—S O—P O ...	64	19	83	66	20	86	No rash.
O O X ...	3	1	4	13	8	21	Rash.
O X O ...	1	2	3	—	—	—	—
X O O ...	6	1	7	—	—	—	—
O X X ...	0	3	3	—	—	—	—
X X O ..	1	0	1	—	—	—	—
X O X ...	1	0	1	—	—	—	—
X X X ...	0	1	1	—	—	—	—
SO PO PO ...	0	1	1	—	—	—	—
SX PO PO ...	1	0	1	—	—	—	—
PDO SO PO ...	2	0	2	—	—	—	—
Two doses—							
SO SO	5	4	9	10	8	18	No rash.
SX SO	1	0	1	6	2	8	Rash.
SO PO	5	3	8	—	—	—	—
SX PO	4	1	5	—	—	—	—
SX PX	1	1	2	—	—	—	—
PDO PO	0	1	1	—	—	—	—
One dose—							
SO	2	1	3	3	1	4	No rash.
SX	1	2	3	1	2	3	Rash.
PDO	1	0	1	—	—	—	—
Total	108	46	154	108	46	154	
Totals ...				81	31	112	No rash.
				27	15	42	Rash.
				108	46	154	

Showing the results as regards rash produced by the administration of different quantities of various kinds of antitoxin in single and repeated doses to all inmates with or without diphtheria, tuberculous or non-tuberculous.

The axillary glands were enlarged in 5 cases, where the injections were made in the back. In one case a chain of enlarged and tender glands extended to the breast. Diarrhœa occurred in one case and chills in another, pleurisy in a third. In two cases hæmoptysis occurred about one week after an immunising dose. In some of the foregoing instances the "complications" were, no doubt, mere coincidences, and I believe this to be true more especially of the hæmoptyses.

Diphtheria Antitoxin aud Rashes.

Doses	Results	—	Male		Female		Total		Total	
			Tuber-culous	Non-tuber-culous	Tuber-culous	Non-tuber-culous	Tuber-culous	Non-tuber-culous	Male	Female
Large Three Two... One... Totals	No rash...	No.	0	1	2	1	2	2	1	3
		%	0	100	50	25	22	40	17	38
	Rash ...	No.	5	0	2	3	7	3	5	5
		%	100	0	50	75	78	60	83	62
	No rash ..	No.	37	8	29	12	66	20	45	41
		%	90	80	76	67	84	71	88	73
	Rash ...	No.	4	2	9	6	13	8	6	15
		%	10	20	24	33	16	29	12	27
	No rash...	No.	4	5	6	3	10	8	9	9
		%	80	83	55	75	62	80	82	60
	Rash ...	No.	1	1	5	1	6	2	2	6
		%	20	17	45	25	38	20	18	40
	No rash...	No.	3	0	0	1	3	1	3	1
		%	100	0	0	50	75	33	75	33
	Rash ...	No.	0	1	1	1	1	2	1	2
		%	0	100	100	50	25	67	25	67
	No rash...	No.	44	14	37	17	81	31	58	54
		%	81	78	69	61	75	67	81	66
	Rash ...	No.	10	4	17	11	27	15	14	28
		%	19	22	31	39	25	33	19	34

Therapeutic Injections.

The tuberculous were treated, when they developed diphtheria, exactly as the non-tuberculous, but, when possible, they were placed in bed out of doors, and slept and lived in rooms with windows wide open at all times.

The antitoxin was given in doses of 2,000 units daily in

Name	Doses			Date of first symptom	Diagnosis		
	Date	Amount	Site		Bacteriological	Clinical	Site
C. H. B. Female Tub.	Jan. 1, 1906 ,, 2, ,, ,, 3, ,, ,, 4, ,, ,, 5, ,,	3,000 3,000 3,000 3,000 3,000	Leg ,, ,, ,, ,,	Dec. 31, 1905. Throat ached, headache Temp. 100·6	+	+	Left tonsil
A. S. Male Tub.	,, 1, ,, ,, 2, ,, ,, 3, ,, ,, 4, ,, ,, 5, ,, ,, 6, ,, ,, 7, ,,	3,000 3,000 3,000 3,000 3,000 3,000 3,000	Leg ,, ,, ,, ,, ,, ,,	Dec. 31, 1905. Nausea. Slightly sore throat; chills	+	+	Right and left tonsils
A. R. Male Tub.	,, 2, ,, ,, 3, ,, ,, 4, ,,	3,000 3,000 3,000	Back ,, ,,	Jan. 2, 1906. Slight angina	+	+	Right post pillar
F. W. Female Tub.	,, 3, ,, ,, 17, ,, ,, 18, ,, ,, 19, ,,	500 3,000 6,000 3,000	Back Leg ,, Abdomen	Jan. 15, 1906. Sore throat, fever with chills	+	+	Both tonsils
A. L. Male Tub.	,, 3, ,, ,, 18, ,, (?) ,, 19, ,,	500 4,500 3,000	Back Leg ,,	Jan. 16, 1906. Slightly sore throat	+	+	Right tonsil (?)
C. E. R. Female Tub.	,, 3, ,, ,, 20, ,, ,, 21, ,,	500 500 4,000	Back ,, Abdomen	Jan. 19, 1906. Throat slightly sore; headache	+	+	Right tonsil
J. S. B. Male Tub.	,, 3, ,, ,, 20, ,, ,, 24, ,,	500 500 3,000	Back ,, Leg	Jan. 24, 1906. Angina	+	(?)	Left tonsil

IN SEVEN PHTHISICAL PATIENTS.

Membrane			Cultures		Complications	Symptoms from antitoxin
Colour	First date	Last date	Date	Result		
Dirty brownish grey	Jan. 1, 1906 (?)	Jan. 5, 1906	Jan. 2, 1906	+	Marked weakness	Jan. 27. Slight itching. Severe rash Jan. 9 to 14.
			,, 14, ,,	O		
			,, 15, ,,	+		
			,, 18, ,,	O		
			,, 20, ,,	O		
			,, 26, ,,	O		
Dirty necrotic	Jan. 1, 1906	Jan. 7, 1906 (?)	,, 2, ,,	+	Slightly irregular pulse	Stiffness in hip-joint and rash on legs, Jan. 15.
			,, 15, ,,	O		
			,, 18, ,,	O		
			,, 30, ,,	+		
			Feb. 4, ,,	O		
			,, 6, ,,	+		
			,, 7, ,,	O		
			,, 10, ,,	+		
			,, 12, ,,	+		
			,, 16, ,,	+		
Yellow white	Jan. 2, 1906	Jan. 4, 1906	Jan. 14, ,,	+	O	Jan. 9. Severe rash for five days.
			,, 18, ,,	+		
			,, 21, ,,	+		
			,, 30, ,,	+		
			Feb. 4, ,,	O		
			,, 6, ,,	O		
Yellow white	Jan. 15, 1906	Jan. 19, 1906	Jan. 16, ,,	+	O	General reaction after each dose. Severe rash, Jan. 20 to 27.
			,, 17, ,,	+		
			,, 30, ,,	+		
			Feb. 4, ,,	O		
			,, 6, ,,	O		
Yellow white	—	—	Jan. 18, ,,	+	O	—
			,, 30, ,,	+		
			Feb. 4, ,,	O		
			,, 6, ,,	+		
			,, 10, ,,	+		
			,, 12, ,,	+		
			,, 16, ,,	+		
Yellow ...	Jan. 20, 1906	—	Jan. 20, ,,	+	O	—
			,, 30, ,,	O		
			Feb. 2, ,,	+		
			,, 6, ,,	O		
			,, 7, ,,	O		
No definite membrane	Jan. 24, 1906	—	Jan. 21, ,,	O		
			,, 24, ,,	+	O	General rash, Jan. 25 to 27. General reaction.
			Feb. 4, ,,	+		
			,, 7, ,,	+		
			,, 10, ,,	+		
			,, 12, ,,	+		
			,, 16, ,,	+		

the thighs until the symptoms and membrane were markedly affected. In 3 patients no rash developed, but one, a tuberculous case, had, besides the two immunising doses of 500 units, only one large dose, 4,000 units. The rash in the other 8 was urticarial, severe and general in 6, confined to the legs in 2.

One patient, a non-tuberculous case, had some cardiac weakness, but no other complications occurred. The cases, with but two exceptions, received large doses on the first day of the appearance of symptoms, when the membrane was wholly confined to the tonsils. The membrane disappeared in 2 non-tuberculous cases in five and seven days; in 5 tuberculous cases, in three, three, five, six and seven days respectively.

No immediate effect upon the tuberculous process was noted in any case. The fever disappeared as quickly as in the non-tuberculous. The cough was not increased, nor did any patient have night-sweats or hæmoptyses, though an occasional pleuritic pain was complained of, which, however, was not out of the ordinary. A careful examination of the lungs a short while after discharge from quarantine revealed, in all cases, an improvement, more or less marked, in the pulmonary condition.

Conclusions.

From our experience in this mild epidemic we would conclude that :—

(1) In institutions immunising doses of antitoxin of 500 units should be given every two weeks for two or three times.

(2) Diphtheria may occur in patients two weeks after an immunising dose of 500 units.

(3) It is impracticable to endeavour to separate individuals with positive cultures from nose or throat without clinical symptoms from those with negative cultures.

(4) One negative culture from the throat is sufficient neither for diagnosis nor for raising the quarantine.

(5) The advisability of taking cultures from the nose, except in nasal diphtheria, may be questioned.

(6) Careful isolation for three or four weeks, under a trustworthy nurse, should be practised. After that time the patient with a positive culture should be kept out of the general dining-room or buildings, and at a distance of 4 feet from all non-diphtheritic patients.

(7) Some untoward symptoms, usually slight, appear in most patients. A rash, arthralgia, swelling and general *malaise* occur most frequently. Slight transitory rise of temperature occurs frequently.

(8) In institutions where the outdoor treatment is rigidly enforced the epidemic will probably be cut short.

(9) In the presence of a diphtheria epidemic patients with pulmonary tuberculosis should be treated, as regards the diphtheria, as apparently healthy individuals.

(10) When the tuberculous contract diphtheria they should be moved out of doors as soon as possible.

(11) Mild diphtheria seems to exert little or no harmful influence upon the pulmonary lesion in the tuberculous.

(12) The antitoxin, in small or large doses, seems to have little or no effect upon the pulmonary tuberculosis.

(13) Immunising doses may be given to patients with fever.

(14) Complications seem to occur after diphtheria no more, possibly less, often in the tuberculous than in the non-tuberculous.

We would like to record here also our hearty appreciation of the kindness of the officers of the New York State and City Boards of Health. We feel that it is but just to say that without their assistance and advice and the promptness with which they supplied us with antitoxin, this mild epidemic

might have been most serious. Our acknowledgments are due also to the health authorities of the village of Saranac Lake and of the township of St. Armand.

DISCUSSION.

Dr. D. Braden Kyle: This paper brings up that old subject on the effect of one bacterium upon another. We know it is a fact that certain bacteria, like people, get along together and others do not. One germ produces a toxin that is antagonistic to certain bacteria, while to others it is synergistic. It is also a fact that we rarely see certain infectious diseases in a certain individual. We rarely see specific infections like syphilis and tuberculosis in the same patient—also that syphilitic or tuberculous children rarely take diphtheria; if so, the after effect is bad. I am inclined to believe this is due to the effect of the toxin produced: this gives a certain reaction and immunity in certain cases and not in others. I saw one case of tubercular history, no distinct pulmonary lesion, with decidedly enlarged glands in the neck. The child developed a malignant diphtheria, was given enormous doses of antitoxin, made a fair recovery from the diphtheria, and in less than six weeks the glands in the neck broke down. They were all removed, and in six months the child developed a rapid tuberculosis and died. The tubercle bacilli were found in the glands but not in the sputum. Glandular tuberculosis, from the standpoint of antitoxin, differs largely from pulmonary tuberculosis; you will find that the glandular cases are susceptible. I am a great believer in diphtheria antitoxin; in fact, in all the antitoxins, but I always use them with a certain amount of fear, because we do not know their definite therapeutic action. I studied the effect of diphtheria antitoxin on bacteria, and it is certainly an erratic agent. You know that in some tuberculous cases we have difficulty in demonstrating the bacillus. If we test the sputum, and find it acid, it will not take the stain; it must be rendered alkaline first. This is due to the fact that the tubercle bacilli is enclosed,—a cellulose capsule, which acids contract, and the stain will not penetrate the capsule; but if the sputum is alkaline, it will take the stain, then, passing it through an acid solution, the capsule will contract and retain the stain. The peculiar reaction that we get from antitoxin in certain cases may be due to strongly acid secretions.

The change produced in the patient cannot always be attributed to the antitoxin, as illustrated in a case of acute thyroiditis with marked œdema of the larynx, which I saw a few months ago. Antitoxin was used and the swelling disappeared within twenty-four hours. The other lobe of the gland became involved a few days later with the same dangerous œdema following. No antitoxin was used, but drugs administered, with the same

result as when the antitoxin was used. I agree with Dr. Bonney that we ought to get the patient to assume some of the responsibility.

Dr. T. D. Coleman (Augusta, Ga.): I have frequently seen, at the autopsy, patients that have died of tuberculosis who had syphilis in all its stages. It is time to call attention to the fact that the diseases do coexist. Dr. Brown was fortunate in limiting the epidemic to the proportions that he did. We know that certain germs live together nicely, and that others antagonise each other. It would be interesting to follow the remote effects in these tuberculous cases.

Dr. H. M. Bracken (Minneapolis): I wish to take issue with Dr. Brown when he states that it was impracticable to isolate the non-clinical cases of diphtheria at the Adirondack Cottage Sanitarium. In Minnesota, the isolation of such non-clinical cases has been carried out satisfactorily and repeatedly at various State institutions. The conditions at the Adirondack Cottage Sanitarium for carrying out such isolation were ideal. Dr. Brown stated that cultures were not taken early from the residents at the sanitarium who did not show symptoms of diphtheria. I think this was a mistake. Had cultures been taken from all the residents early, it might have been possible to have traced the source of the original infection. Still further, the early isolation of those showing the presence of the bacillus diphtheriæ—although giving no evidence of clinical diphtheriæ—might have brought about the suppression of the epidemic much more speedily than was possible under the course that was pursued. Dr. Brown referred to certain individuals talking with a maid ill with diphtheria, while she stood in the doorway of the house in which she was quarantined. I presume he hardly meant to infer that the casual talking with a quarantined individual was likely to bring about the spread of infection. Dr. Kyle referred to the fact that certain syphilitic children did not contract diphtheria during an epidemic in the institution where such children were. It is not safe for us to assume that syphilitics are exempt from diphtheria.

Dr. F. M. Pottenger (Los Angeles): I wish to report an epidemic of pneumonia which occurred in the Pottenger Sanatorium for Diseases of the Lungs and Throat about three weeks ago. Everything was going along smoothly, all were doing well, when suddenly three cases of pneumonia developed. One patient died on the fourth day; another patient, who was occupying a tent with one of the pneumonic patients, died of a fatal hæmorrhage during the epidemic. I do not know where the infection came from, as there was no particular intercourse from the outside.

Dr. D. B. Kyle (Philadelphia): We rarely see syphilis in the same individual, but if you do see it one or the other lesion does not run its regular course. It was a curious fact that none of the syphilitic children did take diphtheria in the epidemic I spoke of. In 70 per cent. I found the bacteria, and not one of them had diphtheria. The germ was there, but there was no suitable condition for it to grow.

Dr. Lawrason Brown (Saranac Lake), N.Y., closing: In answer to Dr. Coleman, I would say that seven patients had diphtheria. In reply to

Dr. Bracken I would state that I cannot agree with him that all cases which have positive cultures of diphtheria bacilli in their nose or throat without symptoms of clinical diphtheria should be isolated. Dr. H. M. Biggs, of New York, whom we consulted in this matter, gave up such an undertaking as a hopeless task. Furthermore, we know that many patients in good health have diphtheria bacilli in their nose and throat. In regard to the maid, I mentioned her merely to show that the quarantine was not as strict as we had thought it was. It serves but to emphasise the fact that unless you have a competent nurse in charge of a case you cannot be certain that the patient is isolated.

DEEP BREATHING AS A THERAPEUTIC AND PREVENTIVE MEASURE IN CERTAIN DISEASES OF THE LUNGS.

By JOHN H. PRYOR, M.D.,
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THE failure to appreciate the importance of deep breathing as a therapeutic measure of the first magnitude, the slight attention devoted to its efficacy in the text books, and the neglect to employ a simple, scientific agency, which often promises more benefit than all other remedial methods known, must constitute the excuse for an endeavour to attract renewed attention to this theme.

The necessity for oxygenation is a well-known physiological fact, but its therapeutic value seems to be almost forgotten. Oxygen is administered heroically in an emergency, but its use in a natural way is sometimes disregarded, when the system may be gradually starving for its daily food.

The purpose of this paper will not allow a consideration of the multiple forms of malnutrition characterised by that complex group of symptoms ascribed to neurasthenia, toxæmia, indigestion, anæmia, gout, &c. We know that insufficient oxidation is a prime causative factor in these conditions, but an attempt to increase the respiratory function is seldom advised or directed. Iron, arsenic and other drugs are administered to patients who never enjoyed a long breath. Many women have never learned how to breathe, and the man who has relinquished vigorous exercise seldom fills his lungs

to the full capacity unless a life insurance examiner desires to obtain full chest expansion.

Very frequently breathing becomes a partial or incomplete function after childhood. Enough air is admitted to support life in a sedentary way, but thorough ventilation becomes a rare experience. Sometimes the individual shows a decided disinclination to use any effort in breathing, and in many instances the attempt is accompanied by exhaustion, sweating, dizziness and cardiac palpitation. This is particularly true of the obese or chlorotic types. When respiratory exercises are employed for any purpose it must be remembered that the result upon general nutrition and the interdependence of many functions is a factor to be included in the amelioriation of morbid conditions.

In considering the effects of deep breathing in affections of the lung and pleura, they may be classified as developmental, preventive and remedial. The first group will include small and deformed chests, with insufficient or restricted respiratory capacity. The deformities due to rickets and spinal curvature are often susceptible of great improvement by combined exercise of the lungs and special gymnastics. The neglect of the little growing patient is sometimes quite pathetic and inexcusable, as deformities can often be decidedly modified and future incapacity or predisposition to disease largely overcome.

Under the head of preventable disturbances or conditions, those demanding special mention at this time are the results of acute or chronic disease of the lung and pleura. I refer to prolonged or delayed consolidation, incomplete resolution and imperfect restoration of function accompanying or following pneumonia; partial consolidation, collapse, or carnification of the lung, associated with or resulting from pleurisy, with effusion; bronchiectasis and fettering pleuritic adhesions. The frequency of atypical pneumonia seems to have increased

decidedly in recent years, possibly due to the prevalence of influenza, grippe and mixed infection ; delayed resolution and lasting consolidation are only too common and are frequently overlooked or attributed to slow recovery. They must be recognised as a phase of the disease and not as a natural effect. The fact cannot be emphasised too strongly that recovery is not complete, and no case should be dismissed until conditions which cripple the lungs, cause chronic invalidism and endanger the welfare of the patient, have vanished. Resolulution may be delayed days, months, or years. It is difficult to decide when the incomplete resolution has become permanent, and the verdict should not be hasty. Consolidation with adhesions are allowed to remain unmolested without any radical persistent attempt to modify or remove them and thus avoid loss of function. The respiratory capacity is diminished, the play of the lung limited, ventilation is inadequate, and chronic changes occur in the form of interstitial proliferation, bronchiectasis, phthisis and collapse. Symptoms appear sooner or later after the attack of pneumonia, and the patient complains of shortness of breath, dyspnœa upon exertion, palpitation of the heart, weariness and pain, often of a dragging character, over the affected side, occasionally increased by deep inspirations. This pain is increased in sitting posture, and is often referred to as backache or side-ache. Quite often it is more pronounced in cold weather. Occasionally, neuralgia of the intercostal, or subscapular nerves is a symptom of continued discomfort. Efforts should be made to eradicate this condition before irreparable harm has been done. While fully recognising the necessity for constitutional treatment, it is not promptly effective unless the lung is urged to resume its work. It is regarded as poor practice to allow a joint to become anchylosed from non-use. If we could handle a consolidated piece of lung tissue, shackled by fresh adhesions, we would squeeze the mass to expel exudate, force air into collapsed

vesicles, establish motion by stretching or tearing adhesions, and, in a word, use massage. Absorption is promoted and expulsion by expectoration is facilitated, the lymphatics are stimulated and normal circulation encouraged. The forcible expiratory act and the cough are our only means of direct drainage. If the cough is persistent and accomplishes nothing, the nose and throat should be examined. As a rule, the greatest deformities and loss of function follow continued pressure from effusion in the pleural cavity. This is sometimes unavoidable, but there can be no doubt that damage is done by neglecting to remove fluid before great distension and pressure occur, and by failing to procure expansion of the collapsed lung while possible. Compensatory curvature and retraction of the ribs are permitted to fill a vacuum when vigorous and systematic efforts might prevent deformity and its results. The facts that adhesions will form after pleurisy with effusion, and that may be salutary, do not justify allowing the healing process to produce immobility and chronic contraction. It is extremely interesting to observe the return of the breath sounds and the gradual disappearance of the friction rub when respiratory exercise is successful.

Any part of the lung structure which can be made pervious to air is a distinct gain, and it is very important also, as a matter of relief and compensation, to increase the capacity of the unaffected lung, which is called upon for extra work. Life dependent upon a partially crippled lung is apt to be very irksome, and the respiratory power can be enhanced to a remarkable degree by securing supplemental development and activity. When intractable, perplexing cases are met the customary advice may be a change of climate. Of course the benefits of a change of scene, environments and habits are not to be under-estimated, but the essential requisites are : an atmosphere which will allow out-of-door life, and the free use of pure air. The patient should be taught that the chief

reason for a change of climate is to be found in the opportunity to carry out proper instructions. Most invalids are inclined to restricted or partial breathing, and a person with a crippled lung is very apt to complain of difficulty in forced respiration, and shrink from exertion which demands an effort and some discomfort. I have repeatedly seen cases where consolidation or collapse with adhesions had existed for weeks and months greatly relieved and restored to health by forcible breathing, properly practised, and it is questionable if the trial is not worth while, no matter how chronic or serious the condition may appear. By the employment of deep breathing we may obtain benefits summarised as follows: Increased oxygenation, improved nutrition, changes of mechanical nature, ventilation and disinfection, massage of the lung and pleura, and drainage. In subacute, obstinate bronchitis, not dependent upon disease of the nose or throat, no other method of treatment is so successful. These cases will improve rapidly, provided cough mixtures are discarded and the patient allowed to breathe fresh air in abundance.

In atypical, protracted cases of pneumonia, the physician's efforts to secure or hasten recovery are often unavailing, physical resistance seems lacking and reinfection and invasion of new territory continue, while persistent fever and consolidation linger in an unexpected and perplexing manner. There are times when forcible action of the affected lung, for definite periods each day, will be more strikingly successful than all other methods of treatment combined. The victims of slow pneumonia or subacute bronchitis are often kept too long indoors and fresh air carefully avoided. Mental and physical apathy are occasionally due to this prevalent practice, and breathing in the open air is what the system demands. Undoubtedly there may be reasons why placing the patient in the open air may be considered unwise, even in these days when open-air treatment for many ailments is becoming a

beneficent craze. Under such circumstances a tin tube connecting with the outer air may be used at the bedside and inhalations practised.

Recently it has become the fashion to interdict forcible breathing in those afflicted with pulmonary tuberculosis. The chief reasons for this action seem to be the dangers from infection of new territory and the inciting of hæmorrhage, caused by congestion or the rupture of weak blood-vessels. During an acute, active process of tuberculous character the established conviction that the rest of the diseased lung promotess recovery seems to have indubitable clinical verification. As the result of some observation, however, I believe the dangers from infection and hæmorrhage are greatly exaggerated. At the same time I doubt that any lasting benefit is to be derived, as a rule, in acute or advanced cases by increased activity of the diseased lung. Deep breathing exercise should be employed with the greatest care in these conditions; but I wish to emphasise distinctly a disagreement with the apparently false doctrine that this practice should be discouraged or prohibited entirely, or for unnecessarily long periods, in the incipient or fibroid forms. When the evidence of an acute process or progressive lesion, as portrayed by the local signs and general symptoms, has disappeared, there seems to be no good reason why the affected and healing portion of the lung should not be fully aërated. We send patients to certain regions believed to be especially beneficial, and depend to an unknown extent upon the remedial influence of pure air. Is it not somewhat inconsistent to cautiously limit the supply of the curative agent for long, indefinite periods? No satisfactory proof exists to demonstrate that exercise of the affected area at the proper time delays formation of a cicatrix. In the absence of facts observers are entitled to an opinion, and better ultimate results are often obtained when the lung is made to perform its function and judicious general exercise is allowed.

The early recognition of pulmonary tuberculosis, and the care of the incipient case, will result in a change of some accepted methods of treatment which have been quite dogmatic, and it will gradually become apparent that incipient and advanced types constitute two widely different clinical problems.

At the New York State Hospital for Incipient Tuberculosis, all patients who exhibited a normal temperature and pulse, and the physical signs of quiescent disease, were given daily respiratory exercises. In no instance was the result in any degree disastrous. The average expansion of all patients when they entered the hospital was 2 inches, and the respiratory capacity was almost invariably below the standard usually required. The almost universal testimony of the patients was that they had never been taught to breathe, and that the effort gave them a sense of well-being and increased the appetite. Some of the number, especially women, complained of feeling tired or dizzy after five or ten full breaths. The practice was supervised by a physician, and much patience and persistence was required in individual cases to secure more than the most superficial, feeble and lackadaisical effort.

During the last year several able clinicians in Europe have been answering the question: "Do Sanatoria for Consumptives Pay?" in the negative. Apparently the claims of "recoveries" and "arrests" have not been verified at home, or the results have proved disappointingly ephemeral. A search for the cause underlying this increasing pessimism, both in Europe and this country, might reveal one worthy of consideration. I refer to the fat, flabby, indolent, short-breathed patients discharged from Sanatoria. A sceptical friend describes the chests of such individuals as "damaged accordions." The importance of a great gain in weight has been most unfortunately and thoughtlessly exaggerated, and the consumptive may be classified as an "apparent recovery,"

while he has become an imposing, deceptive, immobile mass of fatty cells.

Graduated exercise should be a part of the treatment, followed by work tests and the heart's action, and the respiratory function made capable of supporting the necessary struggle for a livelihood.

Probably one of the chief reasons why high altitudes have proved beneficial is to be found in the compulsory increase of respiratory activity. Unquestionably the departure inaugurated at Nordrach from the ironclad prolonged rest cure will lead to reform, and invite one to reflect upon the homely wisdom of Moxon's remark: "It is as important to know what kind of a patient the disease has got, as to know what kind of a disease the patient has got."

When tuberculosis is associated with fibroid changes and pleuritic thickening, vigorous exercise of the lungs may lessen the developing or existing loss of function and increase compensatory or vicarious activity, which may mean so much to the distressed victim. The usually long duration of the disease forms an appeal to make existence as useful and free from limitations as possible. This statement would not apply to cases having the history of recent hæmorrhages, or those in which cavities exist and aneurism of the blood-vessels may be suspected.

Finally, breathing exercises must be taught and watched to be effective, otherwise the effort will be feeble and not systematic. Very often the practice must be made a form of hard work, performed several times a day. The lungs should be filled from bottom to top, and too much stress cannot be laid upon the necessity for as complete an expulsion of air as instruction, insistence and intelligent attempts will permit. Observation will reveal the fact that proper expiratory effort is far more difficult to obtain than the full inspiration. The object to be attained is increase of the tidal

and supplemental, and a decrease of the residual air. In many affections of the lungs secretion or exudate collects in the bronchial tube and can only be expelled by forced expectoration or cough. It is pushed and squeezed along to a point where it can be raised. The annoying wheezing or rattling, so frequently a source of complaint among sufferers from bronchitis or tuberculosis, is many times promptly relieved by determined attempts to expel the residual air. If coughing is produced by deep breathing it is usually beneficial and assists in distending unused lung tissue, stretching or tearing adhesions, and dislodging secretion. At first the patient should be compelled to breathe *in and out* forcibly five or ten times, and repeat this two or three times a day. The clothing should be loose, to allow free action, and certain motions, such as raising and dropping the arms, are helpful in bringing into play the voluntary muscles. In the course of a few days the duration of the exercise may be lengthened and its frequency increased. Sometimes a device, such as a tube or inhaler, may hold the patient's attention and ensure co-operation. The results attributed to various inhalations are probably largely due to the attendant respiratory exertion. In estimating the degree of progress attained the change in the physical signs should be considered more important than an increase in measurements.

No attempt has been made to present the technicalities of this subject, such as pneumatic differentiation and its wider application in other conditions. Perhaps zealous advocates were occasionally extravagant in describing the efficacy of the pneumatic cabinet. However that may be, one familiar with its employment must sincerely regret the tendency to unappreciate or disregard the best method we possess for administering aërotherapy. When the patient can go to the physician's office the cabinet furnishes the means for a scientific, mechanical procedure, which yields results far superior,

or impossible of attainment by other measures. The inspiratory or expiratory effort may be made difficult or easy and graduated in reference to time and amount of exertion. The amount of atmospheric pressure upon the chest wall may be modified and the peripheral and pulmonic circulation somewhat controlled. As a rule, the treatment can be given but once a day, and should often be supplemented by instruction to practise at home with the window open, or, preferably, in the open air. The supposed deleterious effects of deep breathing for a short time through the mouth and the imaginary danger of not allowing the nostrils to warm the air have been greatly exaggerated. Physical exercises to be used in conjunction with deep breathing are described by several authors. The patient may take a deep, slow breath while walking, and count ten or more during inspiration and expiration.

I purposely refrain from discussing exercises which produce rapid breathing, but a final hint may be of some value, viz., strenuous general exercise, which increases the heart's action and the depth and frequency of respiration, may, in many conditions, prove quite harmful or hazardous.

My remarks have been limited to a simple and very important therapeutic measure much neglected, and a reference to methods which are safe and applicable in the class of cases mentioned.

DISCUSSION.

Dr. I. H. HANCE (Lakewood): One group of muscles, the scaleni, have been overlooked in the exercises for deep breathing. All those that are given in the paper are to raise the lower ribs. In talking over the subject with Dr. Knopf, I found him of the same opinion. I will show you one exercise which brings the scaleni muscles into play; by throwing back the head, at the end of inspiration; the upper ribs are thereby forcibly drawn upon and elevated.

Dr. C. L. Minor (Asheville, N.C.): I wish to show one motion which I consider of very great value in expanding badly formed chests, and which I use also in tuberculosis, in afebrile, inactive cases (here the doctor showed the "double figure of 8" club-swinging motion with light one-pound clubs, the inspiration taking place while the clubs were describing small circles behind the shoulders and expiration while they were descending to describe large circles in front of the body.) Let me here also say that a much neglected duty of the family physician is to see, at yearly intervals, that the chests of all the children of the families in his care are developing properly, and in case they are faultily developed, as is so often true, to order such gymnastics as will tend to correct these defects. If this is done I am satisfied that the future incidence of tuberculosis in such children will be greatly decreased.

Dr. Judson Daland (Philadelphia): I would like to call attention to the old motions of the military setting up-exercises. It seems to me that frequently breathing exercises are overlooked. Have the naso-pharynx examined to see if it is clear, so that their breathing exercises will do them good.

THE FRESH-AIR TREATMENT OF ACUTE RESPIRATORY DISEASES, WITH ESPECIAL REFERENCE TO PNEUMONIA.

BY JAMES M. ANDERS, M.D., LL.D.
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SYNOPSIS.—Importance of fresh air in the treatment of pulmonary affections of microbic origin; the unfortunate propensity to base reliance on the products of the manufacturing pharmacist; chemical and bacteriologic impurities of the air leading causative factors in bringing about diseases of the respiratory tract, including pneumonia; thorough ventilation combined with appropriate clothing our principal hygienic measure in obviating many respiratory diseases—*e.g.*, asthma, bronchitis, and bronchopneumonia; pure air both an effective prophylactic and curative agent in this class of affections; influence of temperature of the air on loss of heat by radiation and by conduction from the surface of the body; effect of temperature upon tissue change (metabolism); clinical experience in support of the theory that fresh air possesses superior value in the treatment of pneumonia.

* * *

It is a well-established fact that when a cure is brought about in any of the infections for which we have no specific remedy or serum, the day is with the resisting forces. It is equally true that a most marked fortifying influence of the human system is to be found in certain natural agencies, among which fresh air is one of the foremost. In line with the same argument it may be stated that the most successful treat-

ment of the great white plague is hygienic rather than medicinal, although it is to be earnestly hoped that we shall one day be in possession of a specific serum.

Doubtless one of the principal reasons for the slow progress that has been made in the treatment of pulmonary tuberculosis up to within a comparatively recent period, and still is being made in the case of lobar pneumonia, notwithstanding the already voluminous and ever increasing literature on the subject, is ascribable to the foundationless and misguided hopes, which are too often based on the products of the manufacturing pharmacist, instead of recognising the curative value of natural elements everywhere available; I refer particularly to absolute rest, fresh air, sunshine and appropriate feeding. We may, on reasonable grounds, count this professional propensity to ring in a long list of drugs in the treatment of this disease, the majority of which rest on nothing tangible, but are, like Mohammed's coffin, suspended in mid-air, as most unfortunate.

It required a long period of time for the profession to learn the great value of an outdoor existence in the treatment of tuberculosis, but its superior value has been finally recognised by the medical profession, and it has been before the public long enough in almost every quarter of the globe to prove its efficacy beyond question. Let us hope that no passionate infatuation of the professional mind for new therapeutic remedies will in future proffer a substitute or lead to the neglect of a practice so efficient as outdoor living.

To be effective, fresh, pure air must be constantly applied without regard to the seasons of the year or the periods of the day, although a certain degree of protection can and should be afforded during climatic extremes and under different conditions of disease.

Without doubt, the combined sanatorium and climatic treatment of tuberculosis has given the most favourable

results in that disease. These sanatoria take the form as a rule of cottages, pavilions and tents, the object being to provide the sufferers abundantly with pure external air both by day and night. I am decidedly of the opinion that next to appropriate and vigorous feeding with fat-forming proteids, the most effective element in the treatment of tuberculosis is constant purity of the atmosphere, and also that rest, in cases presenting fever, is equally important.

Whilst this view needs no defence at date of writing, and whilst also the progressive element of the medical profession is wholly convinced of the usefulness of fresh open air in pulmonary tuberculosis, there is still much missionary enterprise needed among the rank and file of that profession. It should be well understood, also, that to be effective the open-air treatment, whether employed in tuberculosis or any other pulmonary complaint, must be carried out in connection with a rigid system of living under the personal supervision of a medical officer or the attending physician.

This is equally true of the fresh-air treatment of the ordinary acute respiratory diseases, particularly lobar pneumonia, which for the sake of convenience merely has been placed in this category. The vast benefits of admitting fresh air freely to the sick room in cases of pneumonia have attracted the attention recently of a few clinical observers, and in view of the very leading importance of the subject, it deserves more extended consideration than it has hitherto received.

Undoubtedly, the normal human system has to a remarkable degree the power of accommodation, and unless exposed for too long a period to atmospheric impurities, no diseased conditions are the result. On the other hand, it is well understood that chemical and bacteriologic impurities of the air are one of the most important factors in bringing about increased susceptibility to the acute infections, including

diseases of the respiratory tract. No attempt can be made here to assign to the various impurities their precise *rôle* of pernicious activity. Stevenson and Murphy[1] have well said: "The evidences of injury to health from impure air are found in a larger proportion of ill-health—*i.e.*, of days lost from sickness in the year—than under other circumstances, an increase in the severity of many diseases, which though not caused, are influenced by impure air, and a higher rate of mortality, especially among children, whose delicate frames always give us the best test of the effect of food and air."

Long since (1862), Sir John Simon stated that with a single exception "the 300,000 (coal) miners of England Wales break down as a class prematurely from bronchitis and pneumonia, caused by the atmosphere in which they live. The exception is important. The colliers of Durham and Northumberland, where the mines are well ventilated, do not appear to suffer from an excess of pulmonary diseases, or do so in a slight degree only."[2] Notwithstanding the fact that as the result of the introduction of more effective ventilation systems in the collieries of England and America, coal miners have been down to the present day peculiarly liable to bronchitis, asthma, emphysema, broncho-pneumonia and fibroid induration (pneumokoniosis) which often leads to chronic ulcerative phthisis. In these cases the lung texture is lacerated and irritated, to be followed by inflammatory processes, by the inhalation of coal dust floating in the atmosphere.

The usual mode of infection with micro-organisms, which have been allowed to accumulate in badly-ventilated habitations, is exemplified in the case of lobar pneumonia, diphtheria, chronic phthisis and other infections.

At all events, bad or vitiated air is an important contributing factor in the causation of this class of affections by fur-

[1] "Treatise on Hygiene," vol. i, pp. 321, 322

[2] Quoted by Egbert, "Hygiene and Sanitation," page 80

nishing a nidus for the propagation of disease-producing germs and by accentuating their virulence. The fact that most cases of bronchitis, both forms of pneumonia (broncho- and lobar), asthma and other lung affections, show an increased incidence during the variable and cooler temperatures of spring and autumn, as well as the maximum prevalence of lobar pneumonia during the cold season, or from December to April, as compared with the exemption enjoyed during the warm season, would suggest that a low temperature and other meteorologic conditions form important factors in their production.

Granting this view, thorough ventilation, combined with appropriate clothing, is our principal hygienic measure in obviating the diseases mentioned above. "While prolonged exposure during the cold, inclement season is fraught with danger, careful, judicious 'habituation of the body to cold air and cold water' becomes at once an efficient and successful prophylactic measure." As elsewhere stated, "may not the higher incidence of pneumonia in winter and spring be due not so much to the direct effect of the low temperature, augmented barometric pressure and velocity of the winds, as to the closer confinement of the populace indoors, in the stagnant air of living-rooms from which the sunlight is excluded, and which tends to lower vitality and decrease resistance on the one hand, and to favour rapid multiplication and increased virulence of the specific poisons on the other.[1] Again, there is an evident tendency, as shown by statistical evidence, for pneumonia and other respiratory affections to prevail most extensively in overcrowded districts and among the impoverished classes. While there is no convincing evidence "as to the exemption of persons living entirely in the open air and thoroughly well-ventilated dwellings, and not exposed

[1] "The Prophylaxis of Lobar Pneumonia," *The Medical News*, June 3, 1905, by the writer.

to infection from others," no doubt can be entertained that the breathing of pure air greatly lessens the incidence of the disease.

Naturally then, pure air is primarily an effective prophylactic agent against the immense majority of both acute and chronic respiratory affections. While the foregoing facts are scarcely, if ever, called into question by physicians, there is a deep-rooted popular prejudice against the too free admission of fresh air into the sick chamber in cases of pneumonia and other acute respiratory diseases for fear of contracting "cold."

In victims of severe acute bronchitis, with lowered resisting powers, a chill constitutes a dangerous experience as a rule. Hence, such conditions permit an outdoor existence only in fine weather and in the milder climates or seasons. But frequent changes of the indoor air, without incurring a strong draught, favours the cure of cases of acute bronchitis even in elderly subjects and children. Moreover, this measure produces a hardening effect.

This method, if conscientiously and persistently pursued, also exerts an especially favourable influence in chronic bronchitis during the racking oscillations of the average American climate. Fresh air appropriately applied, then, is generally to be recommended in the usual forms of acute and chronic bronchitis. In cases of neurotic asthma, marked improvement is often witnessed as the result of a suitable change of air. Now, whilst we cannot meet the variable climatic indications of this disease at home, the immediately beneficial effect of a flood of fresh air from an open window during a paroxysm is so well-known as to make the suggestion appear superfluous.

The popular notion that there is an antagonism between pure, fresh air and the commoner respiratory diseases is clearly unfounded, and the profession should concern itself with the

important question of giving the public the needed enlightenment on the subject. It is to be recollected, however, that fresh, cold air, such as ordinarily admitted into our sick rooms in winter, does not mean that the patient is bathed in, or breathes, a germ-proof medium. Indeed, a subtle diffusion of the micro-organisms that produce pneumonia and lung affections may be in progress at the same moment. The virtue, therefore, of fresh, open air does not reside solely in the quality of pureness, but also and largely upon its low temperature and dryness.

Cold is admittedly an effective tonic, if not combined with an excessive humidity. It is well-known, as previously intimated, that the human body readily endures marked variations, and even extremes, of temperature, remarkably well without obvious danger. Prolonged exposure to extreme cold, however, may prove positively injurious and even fatal. The question here arises, Is the influence of cold equally well, or better, tolerated under conditions of disease such as lobar pneumonia than in health ?

The consumptive, as all know, can sleep with wide open windows during the winter and at minimum temperatures, touching ·10° to ·30° F., with marked benefits to his condition. I have observed the application of the same principle with certain modifications to cases of lobar pneumonia with remarkably happy results. The question arises, By what immutable laws of Nature is the favourable effect of a steady cold produced ?

In the first place, it is an undisputed fact that when the temperature rises above the critical point (Ranke) the organism defends itself from injury by increasing heat dissipation ; the heat is removed in part by radiation and conduction from the dilated surface-vessels. When the sweat-glands become active a large amount of heat is also carried off by evaporation, and obviously the drier the surrounding air the greater the loss of watery vapour in this manner.

The critical temperature, according to Ranke, is from ·59° to 68° F., and it is the "optimum temperature for man, securing the well-being of the organism with least expenditure of energy on its part." It is of therapeutic importance to recollect that a lower temperature demands more active tissue change, and, *per contra*, that a higher temperature demands a special means for getting rid of the heat generated. Obviously, however, the resistance to cold drops below the limit just mentioned in pneumonia, first, because of the artificial devices in the shape of bed-clothes, and secondly, the increased production of heat due to the presence of the morbid process.

In combating high temperature in various acute infections it is recognised that we have an efficient measure in hydrotherapy (cold baths directly abstracting the heat of the body); and also that water at a low temperature (70° F. or lower) produces a decidedly favourable effect upon the nervous system by stimulating the nerve centres, which presided over the organic functions (*e.g.*, respiration, circulation). It is by reviewing our knowledge of the influence of hydrotherapy in this class of affections that we can measurably appreciate the value of a dry, cold atmosphere, which must exercise an analogous stimulating effect.

Briefly analysed, the bracing and tonic effects of a steady cold are as follows: the principal influence exerted is that upon the nervous system; this is evidenced by its calming effect and the refreshing sleep induced thereby. The appetite and digestion noticeably share in the beneficial influences of this natural agency. In this connection, it should not be forgotten that in a cold climate the system demands more nutritive material than in a warm one, or otherwise there will occur a loss of bodily weight. Fortunately, it is found that patients treated with fresh air can take more nourishment than those subjected to other methods, and readily assimilate it. The heart's action becomes slower and the pulse-tension

increased—a desirable object to be attained in the treatment of lobar pneumonia. Cold exerts a tonic influence upon the nerves and vessels in the skin, and indirectly it has an important effect in diminishing the frequency of internal congestions. Again, cold acts potently in stimulating the respiratory function, and as an immediate consequence, more oxygen is absorbed.

It is obvious that an atmosphere containing the full complement of oxygen is demanded in pneumonia—a disease in which a large proportion of the air-cells are rendered functionless. In speaking of the treatment of bronchial pneumonia in children, Northrup[1] pertinently remarks : "Nothing stimulates the heart better than a current of fresh, cool air upon the face. Fresh air stimulates the heart, reddens the blood, quiets restlessness, favours sleep, improves the secretions and digestion, in short, meets most of the indications for treatment of pneumonia in infants."

It has been the custom within the last quarter of a century to select as winter health resorts stations at great altitudes and in northerly latitudes. This is particularly true of foreign countries, where the medical profession has learned the lesson that these mountain resorts are better tolerated by invalids than the ordinary low-lands, although the latter are in closer proximity to the Tropics. The explanation is readily found in the fact that in the Alpine valleys the winters are intensely cold, combined with dryness and stillness of the atmosphere ; and such a climate is more easily endured and more wholesomely stimulating to the bodily functions than the less severe climate of the low-land with its "penetrating damp and windy cold."[2]

We no longer believe in the absolute necessity for high

[1] *New Albany Medical Herald*, April, 1905.

[2] 'Handbook of Climatic Treatment," Huggard, p. 286.

altitudes in the cure of pulmonary tuberculosis, but on the contrary, the majority of present-day sanatoria are situated at lower levels. It is generally accepted as a fact, however, that sanatoria should be located by preference in northern latitudes rather than too near Tropics, because of the difference in the peculiarities and effects of the different climates, already set forth. From the same facts it may be inferentially stated that home winter climates possessing such features as penetrating damp and strong wind currents, would necessitate the exercise of care and caution in applying the fresh-air treatment in cases of pneumonia, although with sufficient covering and the proper adjustment of screens the patients can be efficiently protected.

At first sight it might appear that the fresh-air treatment would diminish heat dissipation by Nature's own methods, since cold, fresh air, tends to contract the surface-vessels, and thus retard loss of heat by radiation and conduction, as well as evaporation of the cutaneous exhalations. It is admittedly important to maintain an active state of the cutaneous circulation and the secretions, and by means of bed-clothes the resistance to cold is greatly increased, and, under these circumstances, mild perspiration may even be induced by systematic tepid spongings, combined with the use of simple diaphoretics. At all events, the theoretical objections which might be urged against the fresh-air treatment are more than balanced by the salutary influences mentioned above, more particularly the bracing effect of the dry cold, with purity of the atmosphere—the two main features of this mode of treatment.

Indeed, it is not my purpose to advocate the fresh-air treatment, to the exclusion of other accepted methods and means in the management of cases of pneumonia, but as a valuable adjunct to what is already known on the subject. The question naturally arises, may not a patient catch "cold"

if exposed to currents of fresh air from open windows? May not such conditions be conducive to the occurrence of the more usual complications of this complaint, more especially bronchitis? It is generally conceded that generalised bronchitis of severe grade is an ominous complication; it intensifies the febrile movement, and augments the dyspnœa and cyanosis, as well as the tendency to cardiac failure.

A personal acquaintance with the fresh-air method, although somewhat limited, justifies the statement and belief that pneumonic patients are in no danger of contracting a cold from perflation of the sick room with fresh air, and that the mere breathing of fresh air, or the flowing of cool air over the face, while the patient is confined to bed, is practically unattended with risk in this respect.

In a severe case of lobar pneumonia, which I saw with Dr. Geo. M. Boyd during the past winter, the nurses were obliged to wear wraps; this was also true of other cases without ill-effects. My personal experience of its use, however, is limited to only five cases—too few to base thereon reliable inferences, yet the uniformly favourable results obtained furnish strong encouragement to its more general adoption.

The fresh-air treatment should not be undertaken without due deliberation upon the peculiarities presented by the individual case. Thus, in certain forms of secondary pneumonia, it might be inadvisable, *e.g.*, when pneumonia supervenes in the course of advanced Bright's disease, or in persons having a highly sensitive nervous organisation, and the like. The response to the action of a steady cold is not always the same.

In general terms, it may be said that this measure is contra-indicated in exceptional instances only, hence there is no difficulty in selecting suitable cases for its employment.

Lastly, among the particularly beneficial effects observed from the constant breathing of fresh, cool, or cold air, are a

better general condition and increased strength, an improved appetite and digestion, more refreshing sleep, lessened severity of the cough, diminished breathing-rate, fever and pulse-rate ; in a word, a less marked toxæmia than in cases treated by the more usual methods. The nervous system, however, partakes largely in the favourable effects.

A NOTE ON THE STATE SEGREGATION OF CONSUMPTIVES.

BY RICHARD A. CLEEMANN, M.D.

PHILADELPHIA.

THE generous diet and pure air insisted upon for the victims of tuberculosis of the lungs, with the systematic disinfection of their sputum, will in the end doubtless very much limit or entirely banish the disease. But this process of extinction is too slow. It is true that death reports from various places show a significant decline in the mortality from phthisis, the reduction from the average death-rate for example in Philadelphia (the city of which the writer is best informed, and the statistics of which will be made use of hereafter), being reported as 13 per cent. less during the last five years than the annual average for the preceding decade. Possibly this may be an exaggeration, the death rates of other diseases, such as pneumonia, being possibly confused with that of consumption; yet if the mortality from consumption and pneumonia are considered together, there still appears in their conjoined total a decrease of 9 per cent. in the same period. This is indeed very satisfactory, but as intimated above, it is not enough.

That results have not been better is perhaps due to the conservatism or scepticism of a certain number of physicians and a lack of energy on the part of others who believe in the modern methods of combating phthisis but have not the force

to overcome the inertia of their patients, who find the rigid regime required too difficult to follow.

Scepticism may be overcome by the campaign of education concerning the nature and treatment of tuberculosis now being vigorously urged on many sides, but it is feared that it will be impossible to deal successfully with the feeble will-power of the physician. Something more must be done to hasten results.

When the profession, or a large part of it, became convinced that Koch had discovered in his bacillus the real cause of tuberculosis, the idea at once presented itself that the stamping out of the disease was to be accomplished by the isolation of those affected with it, following the methods already employed in the actively contagious or infectious diseases; but at the same time it was felt that the plan so successful in diseases of short duration was, especially on account of the great expense involved to the State, not feasible where the malady drags slowly along through several months or years, as is the case in great part with phthisis. But has not this expense been exaggerated? And if the amount needed does reach very large figures, are there not to be found precedents where greater sums have been spent willingly with smaller results in view? The answer to these questions is the burden of this short paper.

Medical writers agree in the great prevalence of tuberculosis, and pathologists declare that the disease is even more widespread than clinical evidence establishes; yet a dispassionate observer will find that well-defined cases of phthisis, even including those called incipient, do not bear a very fearful proportion to the rest of the community. The annual average number of deaths from tuberculosis of the lungs in Philadelphia, during the decade 1891-1900, the date of the last United States census, was 2,600, in an average population for those ten years of 1,080,000 inhabitants. From this death-rate

will be calculated the number of those at one time sick from the disease, for though there is an ordinance requiring physicians to report their cases of tuberculosis to the Health authorities, there are reasons which need not now be stated which render it probable that these reports are unreliable. In a disease where the course differs so much as that of phthisis of the lungs, it is difficult to estimate exactly its average duration, but without going into a wearisome calculation, it is fair to accept the conclusion of a recent writer in Nothnagel's "Encyclopædia of Medicine," Professor G. Cornet, of Berlin, who found the average duration on the basis of an examination of 800 cases to lie between two and three years; in other words, the average duration of a case of consumption of the lungs may be placed at two and one-half years. In a community, then, in which 2,600 die yearly of phthisis there are sick with the disease at any one time two and one-half times that number, or 6,500 persons; this does not seem a very large number among a little more than a million inhabitants.

How much would it cost the State or Municipality if it took upon itself the charge of these consumptives? It is to be remembered that the total includes the early and the late cases: reports from well conducted sanatoria show that the former can be taken care of comfortably at the rate of 1 dol. a day, while it has been found that the hospital treatment of the latter will cost about twice as much, or 2 dols. a day. Without attempting to calculate the relative proportion of these two classes of patients and the intermediate ones, it is reasonable to estimate on the above data that the average cost of each person for all classes combined would be $1\frac{1}{2}$ dols. per day. The 6,500 patients would, then, require an outlay of 9,750 dols. a day, or about 3,500,000 dols. a year. This sum may seem in the abstract very large, but the city from which the statistics were taken is just finishing a filtration plant which has cost 20,000,000 dols., the strongest plea for the installation

of which was the blotting out of the typhoid fever mortality. Yet the average annual death rate from typhoid fever in the decade in which that of phthisis was 2,600 was only 525, or one-fifth the mortality of consumption. Again, the newspapers of Philadelphia are agitating for the abolition of certain grade crossings of the steam railroads in the city, which they call death-traps; it is proposed that the city pay half the expense of this enterprise, and yet on one stretch of road, not more dangerous than others, which would involve an outlay on the part of the city of 3,000,000 dols., the average number of persons killed in a year is not greater than twelve; the expense of this policy will run into the tens of millions. Certainly if a municipality from the standpoint of saving life and suffering can afford these large sums, it can spend as freely to abate the far greater evils of tuberculosis.

From another point of view, it is not to be denied that there are sociological difficulties in the way of the segregation of those suffering from such a malady as phthisis, but it is probable that these difficulties, like that of the expense of segregation, are also exaggerated. This paper does not recommend that these unfortunates be compelled by law or ordinance to go to the sanatoria or hospitals—at least not at first. But these refuges should be ready to be offered to such as would be willing to go to them, and it should be the policy of physicians to urge their consumptive patients to take advantage of such opportunity. There was formerly a popular prejudice against hospitals of any kind, but this has disappeared, or is fast disappearing, as is proved by the long waiting lists of those seeking the sanatoria and hospitals provided by private charity, noble monuments of personal benevolence, but, alas! as yet too few to make more than a ripple on the surface where a mighty wave is needed to wipe out the "great white plague."

DISCUSSION.

Dr. J. H. PRYOR (Buffalo): There is a great deal of force in some of the suggestions contained in this paper. I have long held the conviction that the problem of tuberculosis must ultimately be attacked by the State as an economic question, and that prevention should mean an attempt to cure associated with isolation.

The ideal method of prevention will be found in the proper care of the incipient case. Take the patient from his home and environment and give him a chance for his life. Institutions for the care of the advanced cases should be provided near the home, but it must be remembered that the victim of advanced disease is the neglected early case as a rule. He becomes dangerous, and segregation is advised because no provision has been made for him to regain health. The consumptive is the only unfortunate who cannot to-day find scientific medical relief in accordance with modern methods. During the last ten years we have had an epidemic of literature and a deluge of talk concerning prevention. The time has arrived for scepticism concerning the special methods advised and the enthusiastic proclamations of results. Experience has shown that there exists something puzzling, intangible, far beyond our present knowledge, which may be called "degree of resistance" or anything else until the veil of obscurity is removed. We may employ every precaution in one house, and yet other cases will develop. In another home, where no efforts at prevention are used, the exposed occupants escape. Again, one has a right at the present time to indulge in some heresy and suspect certain hysterical views while the pendulum swings. The proof of direct inheritance and the evidence in favour of latent tuberculosis in childhood is increasing. It is not fair to assume that the claimed decrease in the death-rate from tuberculosis is due to special measures aimed alone at that disease. We have observed quite recently the greatest diminution in the general death-rate ever known in history. The mortality from tuberculosis has shared in the great decline, due largely to widespread improvements in sanitation. It has been asserted in New York State that a continued decrease in the death-rate from tuberculosis will eradicate the disease, but behold, last year the death-rate from tuberculosis increased by 1,500 over the previous year, and the perversity of the disease has not been explained. As a matter of fact, the general death-rate was higher and the mortality from tuberculosis moved with it, as it has done for twelve years. False death returns are made to protect the insured; and the family history is preserved from any history of a disease which insurance companies still mistrust from the study of statistics often more reliable than those furnished by the medical profession. The time has come when the early diagnosis and the improved care of the consumptive becomes a factor in prolonging life. The enthusiastic claims for prevention and the expectation based upon the knowledge of the cause of the disease have not been fulfilled, and

the years pass by while the big procession marches to the grave. Why not admit that the early diagnosis and prompt efficient care of the incipient case promises the highest reward. When we realise that it has been impossible thus far to fill the New York State Hospital for Incipient Tuberculosis with proper cases, and recall the gloomy fact that there are at least 50,000 consumptives in that State, the necessity for State interference and rational education are only too obvious. The loss of wealth in New York State from tuberculosis is greater each year than all the money appropriated by the State for every purpose. The economic side of the question will appeal when other arguments may not. State care of the incipient case will show benefits to justify the procedure. The project is one peculiarly appropriate for State management. This for many reasons does not apply to the advanced victims. Provision should be made for them by the cities or counties. The State cannot at present assume the tremendous burden of extending relief to this vast class of sufferers. The number of advanced cases can be, and should be, diminished by offering help at the right time. There is another point connected with this subject which has not been touched. Quite naturally we would expect a low death-rate in the neighbourhood of a well-conducted sanatorium, but in some instances a village will spring up in the vicinity. The population may increase rapidly, and all classes of consumptives will flock there and stop at boarding houses. It is almost impossible to enforce rules for prevention, and at some of the resorts in this country the supervision and discipline are very lax. Yet the native death-rate from tuberculosis, where the chances for infection are apparently multiplied, is remarkably low. The out-door life seems to be a factor worthy of more consideration. The results of clinical observation form a commentary upon the recent sensational campaign against the white plague, and one is inclined to reflect sadly upon the late flux of garrulity concerning the omnipresent dangers from that disease. Many people at the health resorts in this country spit where they please, and fumigation is often a delusion. In the cities the menace of the consumptive has been wildly exaggerated, and often hardship has been added to affliction. We are taught that the disease is easily prevented, but the method must be educational. At present the public seems to be educated far beyond the profession. The panic has subsided somewhat, and we are beginning to wonder what we really know. Some of the ardent crusaders are now expatiating upon the vagaries and exuberant fancies characteristic of phthisiophobia.

THE MORTALITY FROM TUBERCULOSIS IN THE NEIGHBOURHOOD OF SANATORIUMS.

BY J. H. ELLIOTT, M.B.

PHYSICIAN IN CHARGE, MUSKOKA COTTAGE SANATORIUM, GRAVENHURST, ONTARIO, CANADA.

THE question is constantly arising "Is a sanitorium a detriment to the community about it, or is it desirable that a town should have a sanatorium for the treatment of pulmonary tuberculosis established in or near it?" In these questions the public health is concerned as well as property values, population, and volume of business done.

It is now ten years since the National Sanatarium Association of Canada built its first sanatorium (The Muskoka Cottage Sanatorium) near the town of Gravenhurst, and five years later the Muskoka Free Hospital for Consumptives was built.

An opportunity is now afforded to make a comparison of the mortality rates from tuberculosis during two decades; one before the establishment of the Sanatorium, one immediately succeeding.

Comparatively few statistics have been published bearing upon this subject. All however, which I have been able to find, show very decidedly that a sanatorium is not a source of danger to the community about it.

Dr. Roempler's figures for the village of Goerbersdorf, covering 100 years, have been frequently quoted, but may be again stated.

Deaths from Pulmonary Tuberculosis.

1790—1799 ...	...	...	14
1800—1809 ...	...	...	5
1810—1819 ...	...	...	9
1820—1829 ...	...	...	9
1830—1839 ...	...	...	8
1840—1849 ...	...	...	6
1850—1859 ...	...	...	7
1860—1869 ...	...	...	4
1870—1879 ...	...	...	5
1880—1889 ...	...	...	5

Dr. Brehmer's Sanatorium was built in Goerbersdorf in 1859, and now has 250 beds. Since that date a number of other sanatoriums have been opened in the village, there being now at least 600 beds in the various institutions, a large number of the patients living in cottages in the village.

It must be borne in mind also that the population of Goerbersdorf has more than doubled in the last twenty-five years.

Dr. Dettweiler founded his sanatorium in Falkenstein, near Frankfort on the Main, in 1874. The mortality from pulmonary tuberculosis in the village for the twenty years preceding the opening of the sanatorium was 18·9, while for the eighteen years immediately succeeding it, the rate fell to 11·9.

The Trustees of the Massachusetts State Sanatorium at Rutland have published the following figures relating to the town of Rutland :

Deaths from Tuberculosis.

1881—1886	...	...	14
1887—1892	...	...	11
1893—1898	...	...	11
1899—1904	...	...	8

During the eighteen years, 1881-1898, there were thirty-six deaths; an average of two per year in a population of about 1,000. During the six years after the opening of the sanatorium, there were only eight deaths with an increased population.

The following statistical table for the town of Gravenhurst has been prepared from the registrations of deaths from all

forms of tuberculosis, including pulmonary, meningeal and surgical, the lists of which have been provided by the Registrar General of Ontario, and the Clerk of the Town of Gravenhurst. To Dr. J. A. C. Grant, the Medical Health Officer of the town, I am especially indebted for a careful study of the registrations of deaths from all causes, ensuring that all deaths from any form of tuberculosis are included. The names of those temporarily resident in the town, who came to be treated for their disease, are excluded.

The mortality rates have been estimated on the average population for each decade. The assessor's roll shows that the population was in

1885	1,253
1895	1,848
1905	2,482

making the average population for the first decade 1550, for the second decade 2165.

Deaths from Tuberculosis in Gravenhurst, 1886—1905, *inclusive.*

Before the establishment of the Sanatoriums.				After the establishment of the Sanatoriums.			
Year	No. of deaths		Per 10,000	Year	No. of deaths		Per 10,000
1886	1	...	6·45	1896	2	...	9·24
1887	1	...	6·45	1897	2	...	9.24
1888	3	...	19·35	1898	1	...	4·62
1889	2	...	12·9	1899	2	...	9·24
1890	0	...	0·0	1900	1	...	4·62
1891	4	...	25·8	1901	3	...	13·86
1892	0	...	0·0	1902	2	...	9·24
1893	2	...	12·9	1903	2	...	9·24
1894	3	...	19·35	1904	3	..	13·86
1895	2	...	12·9	1905	3	...	13·86
For the ten years	18	...	11·6	For the ten years	21	...	9·7
Average population, 1,550.				Average population, 2,165.			

Up to December 31, 1905, 1,700 patients have been treated in the two Sanatoriums at Gravenhurst. A great many patients have lived in the town, most of them under careful supervision, others unfortunately without supervision of any

kind. Patients first began to come to the town for treatment during the year of erection of the Sanatorium, consequently, I have considered the statistics from 1896, rather than from the latter part of 1897, when the Sanatorium was opened for the reception of patients.

The Muskoka Cottage Sanatorium is two miles from the town. The Muskoka Free Hospital for consumptives opened in 1902 is one and a quarter miles from the town. In the case of the Massachusetts State Sanatorium, it is situated in the town of Rutland, Mass. The Falkenstein Sanatorium is also in the village, while at Goerbersdorf, many of the patients also reside directly in the village. At Saranac the Sanatorium is over a mile from the town, but tuberculous patients reside everywhere in the town.

Those who are intimately acquainted with Sanatorium work know that there cannot possibly be any detrimental influence upon the health of the community from the presence of a well conducted Sanatorium, but as inquiries are so frequently made on the subject, particularly from communities interested in the location of new sanatoriums, I have felt that these additional figures should be presented. It is perhaps unfortunate that statistics have not been published from more sanatoriums, but those which are to hand show definitely that in every town and village in which, or near which, a sanatorium has been erected for the treatment of pulmonary tuberculosis, the number of deaths from consumption among the inhabitants has lessened subsequent to the establishment of the sanatorium.

It may be of interest to record here the following, which I published in the *Journal of the Outdoor Life*, quoted from the *Gravenhurst Banner:*

"No case of consumption in town or district can be traced to its (the Sanatorium's) presence. . . . That the Sanatorium is a benefit to the town and the farmers in the district

is a certainty. . . . There are no empty houses to be had. . . . There is more business done in Gravenhurst to-day than ever before. . . . Our town was never as prosperous or the future as bright than at the present."

It will be noted, too, that in the foregoing table the population of the town of Gravenhurst has increased in the ten years since the establishment of the Sanatorium from 1,848 to 2,482, an increase of 34 per cent.

The total assessment of the town is as follows :—

In 1895	...	...	...	$266,750
,, 1905	...	...	...	423,945

showing an increase of 157,195 dols., or 59 per cent., in nine years.

In the case of each of the other towns and villages for which mortality statistics are given above, there has been shown to be a marked increase in the population.

Assessment figures are not published for Falkenstein and Goerbersdorf, but the assessment must have increased greatly. Saranac* owes its growth and present prosperity entirely to the presence of the Sanatorium and the noble physician who founded it. Rutland and other centres show a marked increase in the assessment.

Hence the above conclusion may be extended thus :— In every town or village in which, or near which, a sanatorium has been erected for the treatment of pulmonary tuberculosis, not only has the number of deaths from consumption among the inhabitants lessened subsequent to the establishment of the Sanatorium, but there has also been a marked increase of population and an increase in assessment; in the case of Gravenhurst, the population increasing in ten years 34 per cent. and the assessment 59 per cent.

* Dr. E. R. Baldwin nearly ten years ago published the data concerning the village of Saranac Lake, and he has directed my attention to a valuable paper recently published on the subject by Dr. C. F. Gardiner, of Colorado Springs

BIBLIOGRAPHY.

[1] ROEMPLER. "Beiträge zur Lehre von der chronischen Lungenschwindsucht."

[2] NAHM. *Munchener med. Wochenschrift*, No. 40, 1895.

[3] KNOPF. "Prophylaxis and Treatment of Pulmonary Tuberculosis," 1899; *New York Medical Record*, October 3, 1896.

[4] "Annual Report, Massachusetts State Sanatorium," 1904.

[5] ELLIOTT. *The Journal of the Outdoor Life*, November, 1905.

[6] BALDWIN.

[7] GARDINER.

DISCUSSION.

Dr. F. M. POTTENGER (Los Angeles): In spite of the fact that this is the general result wherever a sanatorium has been established, there is great opposition to nearly every new institution starting. In connection with this subject I would like to call attention to the little town of Davos, Switzerland. This place is a favourite resort for tuberculosis patients. There are eight sanatoria with accommodations for about 1,500 patients. The town has over 20,000 visitors a year. In this little town every room is cleansed and disinfected after being occupied, unless the previous occupant can prove himself well. Physicians and hotel keepers act in harmony, and endeavour to see that the health provisions are followed out carefully. It is estimated that nearly three-fourths of the annual visitors are tuberculous, and it is doubtful if there is ever a time when there are not more tuberculous patients in Davos than there are permanent inhabitants; but in spite of this, the death-rate is very small, being only 4 per 10,000 inhabitants, while that of Germany is 22 per 10,000, and that of our country about 19. This shows that when proper care is taken patients suffering from tuberculosis are not a menace to those living with them.

Dr. J. H. PRYOR (Buffalo). There is another point connected with this subject, and that is that we naturally would not expect in the neighbourhood of a well-conducted sanatorium an increased death-rate, but the mysterious part of it is that usually near a sanatorium a village springs up, the population increases and the people flock there. It is absolutely impossible to carry out all the methods of prevention. Some people will spit where they please, and you have a congregation of tuberculous cases, and you have a diminished death-rate. It is a commentary on the scare we had as to the infection of tuberculosis. I do not want to mention any names, but those same men are now writing papers on the dangers of phthisiphobia.

Dr. S. G. BONNEY (Denver, Colorado): We can readily understand why, on account of educational influences, a diminished death-rate from

tuberculosis may obtain in sanatoria and in the immediate vicinity. In Denver, however, the situation is somewhat unique, for even there, the mortality rate is diminished, although sanatoria accommodations are utterly inadequate, and in spite of the fact that there are other conditions existing which would naturally lead us to expect an increase in the death-rate. I refer to the constant influx of tubercular patients, many of whom do not come under responsible observation and supervision, and therefore become what may be regarded as careless consumptives, and to some extent a menace to any community. Many of these patients have children while still in the active stage of the disease. Infants are not only born with an inherited susceptibility to tuberculosis, but are subjected as well to unusual opportunities for infection.

Some years ago an effort was made to establish the claim of an increase of tuberculosis in Denver, and official statistics were collaborated to this end. A careful, systematic analysis of the very statistics upon which statements were made tending to substantiate an alleged increase of tuberculosis, showed beyond all question that indigenous tuberculosis was *diminishing* annually to quite a remarkable extent.

In 1897 and in 1902 I published papers embodying the results of my observations and study of statistics pertaining to this subject. A considerable number of cases of tuberculosis reported as having developed in Colorado, were found to have resided but a short time within the State. Nearly one-fourth of all deaths from non-imported tuberculosis were cases of tubercular meningitis in little children. A large number were found to be instances of so-called miners' consumption, in which the tuberculosis, if a factor at all, existed merely as a terminal infection engrafted upon cases of chronic bronchitis, emphysema, pneumono-koniosis, and circulatory disturbances. It is apparent that in such instances tuberculosis was not the essential factor. It is of interest to know that the regions in Colorado in which miners' consumption developed, were in those locations where tuberculosis was scarcely ever known to exist to any extent, as in sparsely-settled regions upon mountain sides. On the other hand, counties like El Paso and Denver, where the people congregated in large numbers, exhibited but comparatively few instances of infection.

Dr. J. H. ELLIOTT (closing): Great care has been taken to make these statistics reliable. The Medical Health Officer of the town has gone over the registrations of deaths very carefully, and we found together that a number of deaths from tuberculous meningitis were not recorded as such, but as simple meningitis. These were added to the list. I think Dr. Baldwin quite right in his contention that great attention should be paid to the deaths from meningitis in a town where there are many tuberculous patients.

EMPYEMA OF LONG STANDING: OPERATION OF SIMPLE INCISION: RECOVERY WITHOUT SUBSEQUENT RESECTION: PRESENTATION OF PATIENT.

BY IRWIN H. HANCE, M.D.
LAKEWOOD, NEW JERSEY.

Walter C.M., aged 32, married, U.S. Family history negative. All members of his family strong and rugged type. Has never been ill. Following an attack of extensive boils about two years previous to his operation suffered pain in left side. This distress was constant in his side and his general condition permitted him to work off and on, but he always felt sick. In November, 1903, was unable to work at all and grew steadily weaker and weaker. Was constantly under physician's care and finally was sent home from a hospital to die of consumption.

Was seen by me on April 23, 1904, after a twenty-five mile carriage drive to his home. On examination the following day, diagnosis of empyema was made—needle inserted and pus withdrawn. Operation advised but deferred for a few days to build patient up. Sputum examinations negative.

On May 7, about 1.30 p.m., began spitting up large quantities of very foul-smelling pus. For a time I hesitated about operating because his heart was so feeble and general septic condition. Finally I plunged a scalpel between his ribs (7-8), and evacuated from 1½ to 2 quarts of pus. Two drainage tubes were inserted. His recovery was complete; the only

complication being extensive undermining of the tissues of the back as shown by the other scars. The tubes were removed by October of the same year and he has been at work ever since.

I present this case to you as of interest because of the complete expansion of the lung after being compressed for so long a time and also to encourage anyone to operate on what at the moment one may judge to be a hopeless case.

DISCUSSION.

Dr. C. L. MINOR (Asheville): Had you examined the sputum?

Dr. HANCE, in reply, said the sputum was negative as far as tuberculosis was concerned. It may have been streptococcus infection.

Dr. W. G. SCHAUFFLER (Lakewood): I had the pleasure of being with Dr. Hance when the incision in this case was made. The patient was moribund, and it did not seem that he could live half-an-hour. The doctor resorted to stimulation, and within ten minutes after the pus was started, his condition began to improve, and within half-an-hour it was apparent he was going to get well. All his functions improved rapidly, and by the middle of the same evening he was apparently out of danger.

Dr. W. D. ROBINSON (Philadelphia): I would like to have the subsequent history of the patient. It has been my experience that these cases within five years develop a rapid tuberculosis.

Dr. E. L. SHURLY, the President (Detroit): In our section of the country we meet with a large number of cases of chronic lung disease which are of this character, and we are accustomed to operate on them. A number die, of course, because we usually operate on nearly all of them. We open them up no matter how nearly moribund they are, and it is very good that we do. In the old cases, it is my opinion that the majority may have "sanious pus." I congratulate the doctor on getting such a good result from his case. It is true that the nutrition is so interfered with, and also the circulation, that many of them do die of tuberculosis or sarcoma. I have always taken out a piece of one, two or three ribs. Of course, there is some shock and some risk, but "the game is worth the candle." I have recently had three such cases as the doctor's, due to mistaken diagnosis. Fortunately all three recovered. Sometimes, however, more than half such cases die. I feel, however, that these people ought to be given a chance, and I take the responsibility, and the results so far have justified that policy. You will find a lot of cases of pleuritic adhesions and such chronic lung disease that might be saved by operative procedure, but they are often

allowed to go on and have their lives frittered away by leaving them to Nature alone.

Dr. HANCE (Lakewood): Of course, the man's resistance was reduced by reason of his illness, and he could develop tuberculosis, but the patient is living in a good climate and works as a coachman, and as that gives him plenty of outdoor exercise, I have no fear of subsequent infection.

Dr. S. G. BONNEY (Denver, Colorado): I have seen a great many cases like the one described, and I am strongly impressed with the fact that the treatment of empyema in tuberculous patients is not subject to precisely the same principles as the treatment of empyema in non-tuberculous cases. In the non-consumptive, the accepted treatment is to evacuate the pus and permit continued drainage. This frequently demands resection of a rib. The fact that Dr. Hance has secured a good result without resection does not constitute any valid argument against resection in other cases. In tuberculous patients the indications for treatment are not invariably evacuation and drainage. The treatment of such cases should depend, to my mind, almost entirely upon whether or not there exist the chills, fever and sweats of sepsis. Under such conditions the consumptive is entitled, no matter how great his extremity, to the same methods of procedure as the non-consumptive. I have frequently seen remarkable results follow evacuation and drainage of a pleural effusion in tubercular patients who were almost moribund. If, however, there is no fever or other evidences of sepsis, it is assuredly poor treatment to resort to radical measures, unless the effusion is so large as to produce cardiac and respiratory embarrassment. If such exists, in the absence of chills, fever and sweats, it is my custom to practise aspiration of the effusion, which may be repeated from time to time, and not resort to resection unless compelled to do so by the development of symptoms of sepsis. I am also loth to resort even to aspiration, unless for the sake of removing the effusion—in other words, as a direct therapeutic measure. I do not believe in the practice of exploratory puncture for the mere sake of diagnosis. If indications are present for the removal of the liquid, I believe in aspirating at the time, but not if the conditions suggestive of removal do not exist. It seems to me to be poor practice to employ the exploratory puncture simply as a diagnostic measure. No matter how careful the technique, nor how irreproachable the needle, serous effusions have surely been converted into purulent ones as a result of this practice. Therefore if it is not necessary to remove, it is not necessary to aspirate. If sepsis is pronounced it is of course necessary to resect; in such cases even aspiration is of little avail. Under these conditions, however, it is well to bear in mind that resection of rib and removal of a large quantity of pus is inevitably followed by one of two conditions; first, that the lung is bound down by adhesions to such an extent as to prevent its expansion, and the subsequent obliteration of the pleural pus cavity, in which event the patient is brought face to face with a long-continued suppurative process and the probability of amyloid change in other organs, or a recourse to a formidable rib resection; second, that if the lung does expand

and finally obliterate the pleural cavity, opportunity is afforded in the expanded lung for a renewed tubercular activity and the possibility of rapid cavity formation. These conditions I have had opportunity frequently to observe from my own personal experience.

Dr. J. C. WILSON (Philadelphia) : I agree with Dr. Bonney about exploratory puncture for diagnosis. It is a serious blunder. If you suspect and cannot be sure by the ordinary methods of physical diagnosis, you should present the matter to the patient's friends and then aspirate, seeing that a sufficient quantity is withdrawn. If it is found to be pus, there are rare cases in which the removal of purulent effusion is followed by return to health. I want to take exception to some of the statements, and I entertain a different view from that expressed by Dr. Bonney. Dr. Hance is right in this case ; even though the patient was in the jaws of death, he let the fluid out. That was proper. If the doctors who handled the case before had recognised this condition and done the same thing, the patient would have been saved much suffering and would have had a better lung than he has, although what he has is a very good one, although there is some thickening. I teach large classes of students and think I have been able to demonstrate to them that as soon as a pleural effusion is recognised it is a proper thing to aspirate, so that I do not allow the small serous effusion to become a large effusion. Sometimes a single aspiration results in a cure ; sometimes three operations are required ; sometimes the patients are sent out within ten days. I know the traditions of the profession, that it is improper to aspirate a serous effusion in a tuberculous case, but if it is done early you save damage to the patient's lung. The lung never fully expands after pressure. I know it is true that in the tuberculous patient who has carried an effusion a long time, the tubercular process becomes more active after the withdrawal of the fluid, but where it is taken out early this does not take place. What I stand for is the early removal of the effusion.

Dr. C. L. MINOR (Asheville) : In the first place, it seems to me to be distinctly bad practice to allow a non-purulent effusion, even though the patient be not septic, to remain in the chest ; the old rule, *ibi pus ubi evacua*, holds here as well as elsewhere, and I cannot believe that it is good practice to leave pus in the thorax. I heartily agree with Dr. Wilson that fluid in the chest is not by any means a *noli me tangere*. With the proper apparatus and proper technique we should be able to aspirate from time to time and not turn a serous effusion into pus. However, the pressure on a diseased lung of a serous effusion in tuberculosis often has a good effect on that lung, though after its removal I have not had Dr. Bonney's experience in finding the tubercular process to light up. Personally, I believe it good practice to leave such an effusion for a time, unless or until there are dangerous pressure effects, then removing them gradually and allowing re-expansion of the lung.

Lieutenant-Commander THOMAS HILAND (U.S.N.) : I rise to do honour to old Dr. Bowditch. He has passed and gone, but his teachings

I hear to-day. I was one of his boys. He taught us, and correctly, to aspirate where there was a suspicion of fluid. I would make one other point. There are accumulations in the chest which are not from the pleural cavity, and they should be aspirated and removed. Many a person has been rescued by finding this abscess and by its removal.

Dr. R. H. BABCOCK (Chicago): Both Drs. Bonney and Wilson are right. There are cases which demonstrate the truth of what Dr. Bonney said, that when the fluid is withdrawn, the tuberculosis becomes acute. There are other cases in which permitting the fluid to remain has favoured the cure of the tubercular process. Nevertheless, I believe Dr. Wilson is right in the majority of cases when he says fluid should be withdrawn early. I do not think Dr. Bonney would maintain that in all cases of tuberculosis he would allow the fluid to remain. The subject is one which requires very attentive consideration and cannot be disposed of arbitrarily or on any one definite principle. The case must be considered as a case. With reference to exploratory puncture, there is a danger of infection of the serous effusion and its conversion into pus, but I am not clear that where a serous effusion after puncture has become purulent, it is always due to infection, because it is well known that a serous effusion can become purulent because of its richness in cellular elements. If the case is one in which I cannot make a diagnosis without I make a puncture.

Dr. S. G. BONNEY (Denver, Colorado): Twelve years ago I prepared a paper upon the treatment of empyema, which embodied the same principles and methods of procedure that have been so well described by Dr. Wilson and Dr. Minor. Ten years afterwards I felt compelled to recede from the position then taken and to modify my ideas of treatment because of my experience and my mistakes.

For quite a number of years up to the time that Murphy made his remarks in Denver upon compression of lung as a method of treatment for tuberculosis, my attention had been called to the fact that when my tubercular patients developed a pleural effusion they not infrequently got better. There was often a diminution of fever, lessening of cough, and gain of weight. I had been in the habit of aspirating early, and noted to my surprise a return of the fever and aggravation of cough. Since then I have been in the habit of letting my tubercular patients with a small effusion alone, unless there were special reasons demanding its removal.

Dr. I. H. HANCE (Lakewood) closing: As to early aspiration, we may turn a serous effusion into pus. In reference to the treatment of an effusion, if it is serous aspirate only when we are obliged to: if it is pus surgical procedures are the best to act upon, and, as Dr. Minor said, you thereby relieve the other organs from possible danger.

RELATION OF TEMPERATURE, HUMIDITY AND WINDS TO CHRONIC NEPHRITIS.

W. F. R. PHILLIPS, M.D.
WASHINGTON, D.C.

In considering the physiological effects of atmospheric conditions upon the kidneys, we should keep in mind the reciprocal relations existing between the eliminatory activities of these organs and those of the skin, the intestines and the lungs. The exponent of this relation is chiefly in the watery component of the respective excretions. Though the urine and the sweat are chemically closely related qualitatively, there is but little evidence for believing that the functions of the kidneys can be discharged by the sweat glands, or that the kidneys can do the excretory work of the skin. Between the excretions of the kidneys and those of the intestines and lungs there is, so far as is known, no general quantitative resemblance except in their aqueous content. It is a long ago observed fact that when the skin is over active in sweat excretion there is a corresponding diminution in the quantity of urinary water, and, on the other hand, an active kidney excretion is associated with a decreased cutaneous output. Similar reciprocal relations have been noticed between the watery excretions of the kidneys and those of the lungs and of the intestines.

The anatomical location of the kidneys is such that there is no reason to believe that these organs are directly impressed by changes in meteorological surroundings. What effects follow as a result of such changes, or as a result of a continuation of conditions different from those normal to the

case in question, are due to indirect action, exerted primarily upon the thermogenetic and thermotaxic centres of the organism, and, more remotely, to metabolic activities following as a consequence of thermokinesis. The physiological effects of the meteorological conditions of temperature, humidity and wind movement, in so far as these effects seem to bear immediately upon the subject under consideration, may now be briefly stated: Fall of temperature causes an immediate contraction of the peripheral blood-vessels and a coincident dilation of the internal or deeper capillaries. Despite this internal dilation, there is, according to Hayem, a rise of blood pressure. (This rise of blood pressure may be due to the general contraction of the muscular and superficial connective tissues.) The contraction of the superficial blood-vessels is brisk, and their relaxation slow. There is always a certain degree of stasis of blood and lymph, which persists for some considerable time. If the exposure be prolonged, the superficial contraction is followed by a relaxation or even temporary paralysis, and the blood-lymph stasis may become so great as to require active measures, such as friction, massage, &c., to overcome it and restore the surface to its normal state. This blood-lymph stasis is a familiar winter experience.

While these vascular changes are taking place, there are also changes in the thermal state of the body. The superficial parts fall in temperature, the deeper parts rise, while the intermediate zone remains normal. Oxidation, as determined by the elimination of respiratory CO_2, is increased Hayem states that the amount of oxidation bears a close relation to the subjective sensation of cold. The intensity of these effects is, of course, dependent upon the extent of the temperature fall. Should the temperature go below 59° F., there follows a change in the method of body heat maintenance. Above this point the heat regulation is effected by

physical changes in the thermotaxic apparatus; below by increased bio-chemical activity of the tissues. The effect of temperature fall upon the kidneys is, by increasing the volume of the blood in the internal vessels and the general rise of arterial tension, by increasing the velocity of the blood flowing through them (and in all the deep-seated viscera), to increase their excretory activity and output. The associated cutaneous anæmia decreases the sweat, and, as a consequence, the watery excretion of the skin devolves, for the time being, upon the kidneys, lungs and intestines, and chiefly, as far as evidence goes to show, on the kidneys. Generally speaking, temperature rise produces the opposite effects of temperature fall, with the following general qualification, that reaction to rise of temperature is not as brisk as to fall. The phenomena of cold being apparently those of protoplasmic contraction, and those of warmth those of protoplasmic relaxation.

The influence of atmospheric humidity upon the functions of the kidneys is through its effect in promoting or retarding cutaneous and respiratory evaporation. With respect to the skin, evaporation from a moist surface depends in a quiescent air upon the relative humidity. The nearer the point of saturation, the slower the rate of evaporation, and the greater the deficit of saturation, the more rapid the rate. In any given case, the actual amount of water that may be evaporated will depend upon the temperature and the wind movement. For example, in a quiet atmosphere at 30° F., and 80 per cent. relative humidity, in a given time, a cubic foot of air could receive but ·038 of a grain of water more before becoming saturated; whereas, at a temperature of 80° F., and the same relative humidity, in the same time, a cubic foot of air could take up ·219 of a grain, or about six times as much. Should the air be moving, it will readily be seen that the potential evaporation in a given time will be greatly affected. Hence we see that the humidity is, so far as

cutaneous evaporation is concerned, intimately dependent upon the activities of the two other factors, atmospheric temperature and movement. As to the relation of humidity to respiratory evaporation, the conditions are somewhat different. Here we find that the absolute humidity of the inspired air practically determines the amount of moisture exhaled, irrespective of the atmospheric temperature and the wind movement at the time. The inspired air is expired, generally speaking, at a temperature slightly below that of the body, varying from about 98° in summer to 90° in an average winter. It is usually inspired at from 20° to 50° below that at which it is expired, and it contains, on inspiration, about 60 per cent. of moisture of saturation, while on expiration it is about saturated at the temperature at which expired. For example, if inspired at 60° F. and 70 per cent. relative humidity, each cubic foot of air would contain ·402 grain of water, and, upon expiration at 94° F. and 90 per cent. saturation, it would contain 1·497 of a grain.

The physiological effects of wind are complex. Its effect in promoting cutaneous evaporation has been referred to. The wind intensifies the action of temperature change. When, as is usually the case, the atmospheric temperature is lower than that of the body, the greater the velocity of the wind the greater the loss of heat, other conditions being equal. Should the atmospheric temperature be above that of the body, the effect of a wind is most harmful, as evidenced in the frequent disastrous consequences of the hot winds of great deserts. There is also to be considered the physiological effects that may follow the constant bombardment of the skin by the air particles driven with the velocities obtaining in ordinary winds and in strong gales. Owing to the greater variability of wind phenomena our exact observations on this aspect of its action are deficient. What few there are indicate that exposure to wind is followed by a greater or less ten-

dency to drowsiness. There is also another effect that it may be necessary to consider, and that is that of increased physical exertion required to be expended in any given exercise if performed against the wind, for example, the increased fatigue incident to walking against it.

To show the effect of meteorological environment upon body temperature I quote the results of some personal experiments made some years ago. (The results are the average of a series.) In room, average temperature of 76·5°, the temperature of the skin under clothing was 95·5°, going out doors into a temperature of 39·3°, and a wind movement of 8·3 miles per hour, after the lapse of twenty minutes the skin temperature had fallen to 92·6°, and that of the mouth from 98·5° to 98°. The skin and mouth temperatures did not return to their normals for thirty minutes after re-entering the room.

That we have in the meteorological conditions under consideration agents that can influence the normal functioning of the kidneys and of other organs of the body, is evident. It would therefore seem reasonable to suppose that these agencies are capable of influencing the kidneys when diseased.

Reference has also been made to metabolic changes that follow as a result of disturbance of the thermal equilibrium of the body. These more remote changes may have even a more pronounced influence upon the functioning of the kidneys. I think that we must here admit that we are hampered in the consideration of the subject under discussion by our ignorance of the etiology of the chronic inflammations of the kidneys. Clinicians are better agreed as to the therapy than they are as to the etiology of chronic nephritis. For instance, Senator, in Nothnagel's "Encyclopædia," hardly accords meteorologic or climatic conditions any etiological importance, whereas, W. H. Dickinson in Allbutt's

"System of Medicine," states that these conditions exert "an overruling influence in regard to the origin of the disease." As far as geographical pathologists mention the distribution of kidney disease they appear to bear out the assertion of Dickinson and those holding with him. Until more definite knowledge is at hand, I believe we cannot be severely criticised if we attribute to climatic influence a considerable share in the production of chronic kidney inflammations.

Apart from the immediate physiological effects brought about by temperature and other changes, we must bear in mind the possibilities if not probabilities of the slower alterations in metabolic products. It does not seem far fetched to suppose that there may be produced and accumulate in the tissues, as a result or as concomitant of the blood-lymph stasis already mentioned as occurring, bye or effete products which when thrown into the blood upon restoration of normal circulation may act as irritants to the kidney cells. This is at present but an imagination—but one worth while thinking of and investigating.

Passing to the therapeutic use of the climatic elements of temperature, humidity, and wind, their application will depend on the view we take of the particular case in hand. It seems to me that we have different therapeutic indications to meet just as we regard a given case of nephritis as the result of the kidneys suffering because of original sin on their part, so to speak, or as vicariously bearing the iniquities of other organs or tissues. Of course, I suppose we all agree that no matter what the origin of the trouble may be the first indication is functional rest for the diseased organs. Clinical experience seems to show that climatically, warm, equable and dry climates give the best results, apparently meeting the requirements of functional rest so far as atmospheric environment is concerned. The logic of such a climate seems reasonable enough, provided we are dealing

with kidneys originally at fault. But suppose the trouble arises from some defect of metabolism elsewhere in the body and the kidneys are suffering because of an irritant, toxin or what not, brought continuously to them for elimination or maybe for elimination elsewhere, but acting injuriously on the kidneys during its passage through them? Would such a climatic trinity be the most beneficial? In such a suppositious instance it would seem that we might wish rather to increase the urinary excretion so as to dilute the irritant. If so, we would wish a cool climate, one where cutaneous evaporation was small. Again, should dilution of the irritant not be our only object or most important one, we might find that the continued production of the *materia morbis* could be reduced or completely done away with by a more stimulating climate—one that demanded more of the general metabolic activities. These are simply questions brought up for consideration and but a few of the many that this subject seems to possess.

INDEX.

D = remarks in discussion.

A complete index of Volumes I. to XXI. will be found five pages further on.

ACUTE cardiac dilatation in diphtheria, 79
Acute cardiac dilatation, some forms of, Beverley Robinson, 71
Æsculapian health resorts, R. G. Curtin, 204
Air, fresh, for pneumonia and other acute respiratory diseases, J. M. Anders, 262
Air of collieries and lung disease, J. M. Anders, 295
Albumin, chart showing excretion influenced by barometric pressure, H. Sewall, 125
Altitude and nephritis, H. Sewall, 117
Anders, Howard, tuberculosis service at Blockley, Phila., 242
Anders, J. M., fresh air treatment of acute respiratory diseases, with special reference to pneumonia, 262
on home treatment by Nauheim method, D, 84
relation of climate to nephritis, D, 158
Antistreptococcic serum in tuberculosis, S. G. Bonney, 230
Antistreptococcic serum in tuberculosis, J. H. Elliott, 233
Apical outline an aid to diagnosis in pulmonary tuberculosis, 185
Arterio-sclerosis and diabetes; treatment with Nauheim baths; death, P. K. Brown, 112
Arterio-sclerosis and renal disease, P. K. Brown, 114
Artificial Nauheim baths in chronic heart cases, P. K. Brown, 108
Augusta, Ga., 53
Avogadro and Ampere on aqueous solutions, law, 43

BABCOCK, R. H., is tachycardia in early tuberculosis secondary to low blood pressure? D, 101
salicylates, place of, in treatment of acute rheumatism, D, 93
treatment of nephritis, D, 160
Bacteriology of cerebro-spinal meningitis, Thomas Darlington, 59
Baldwin, E. R., toxic character of tachycardia in early tuberculosis, pathological view, D, 100
Balneology in relation to renal disease, C. C. Ransom, 141
Barometric pressure, influence on nephritis, H. Sewall, 117
Baruch, S., influence of hydrotherapy on the pulse and respiration, 152
Bleeding, local, valuable in acute cardiac dilatation, B. Robinson, 76
Blood, influence of hydrotherapy on the, 153
Blood pressure and stasis, W. F. R. Phillips, 293
Blood pressure, venous, 122, 123
Bonney, S. G., care of far-advanced cases of pulmonary tuberculosis, 215
death-rate near sanatoria and in Denver, Colorado, 285-6
salt infusion for renal disease beneficial, D, 164
treatment of empyema, D, 289
treatment of empyema, Murphy's method, D, 291
Boston and Denver, climates compared, H. Sewall, 119

Bracken, H. M., diphtheria epidemics, D, 249
Breathing, deep, a preventive measure in lung diseases, J. H. Pryor, 251
Breathing exercises, J. Daland, D, 261
Bridge, Norman, the hot morning bath, 166
Brown, Lawrason, study of a diphtheria epidemic at Saranac Lake, 236
Brown, Philip King, artificial Nauheim baths in chronic heart cases (charts), 108
Butler, Glentworth R., heart-block, case and autopsy, 102

Caisson workers, pains during the period of decompression, Sewall, 121
Cardiac dilatation, some forms of acute, Beverley Robinson, 71
Cerebro-spinal meningitis in New York City, 1866-1905, Thomas Darlington, 56
Cerebro-spinal meningitis, not contagious, R. G. Curtin and J. C. Wilson, D, 70
Cerebro-spinal meningitis treated with diphtheria antitoxin; the latter not useful and not harmful, 67
Cleemann, R. A., State segregation of consumptives, 274
Climate and metabolism and circulation, Boardman Reed, 180
Climate, choice of, Shurly, 4
Climatology, study of, in medical schools, H. P. Loomis, 7
Coal tar products, pernicious, B. Robinson, 86
Cold air, action of, in acute pulmonary disease, J. M. Anders, 270
Cold bathing in the morning not suitable for everyone, Bridge, 166
Coleman, T. D., tuberculosis and syphilis, D, 249
winter health resorts in the South, 51
Colombo, Carlo, action of the waters of Fiuggi, Italy, 34
Cornet, tachycardia and *delirium cordis*, 97, 98
Curtin, R. G., a comparison of some Æsculapian and modern health resorts, 204
non-contagiousness of cerebro-spinal meningitis, D, 70

Daland, Judson, diagnosis of right and left ventricular dilatation, and venesection, D, 94
Darlington, Thomas, cerebro-spinal meningitis in New York City, 1866-1905, 56
Denver, climate of, influence on nephritis, Sewall, 117
Denver, Colorado, death-rate from tuberculosis, Bonney, 286
Digitalis sometimes valuable in weakness of heart from toxæmia of pneumonia, Robinson, 77
Diphtheria at the Adirondack Cottage Sanatorium, L. Brown and A. H. Allen, 236
Dyspepsias, 134, 135

Electric light cabinet, J. H. Pratt, D, 162
Elliott, J. H., mortality from tuberculosis near sanatoria, 280
Empyema; recovery, I. H. Hance, 287, 291
Endocarditis, acute rheumatic, in children, B. Robinson, 72
Enteroptosis a cause of dyspepsia, 132
Erlanger, anatomy of the heart, 102
European waters of low mineralisation, 39

Fiuggi, Italy, waters of, Carlo Colombo, 34
Florida Resorts, 51
Food in tuberculosis, S. G. Bonney, 222

Georgia Resorts, 31
Gibson, W. M., tachycardia of early pulmonary tuberculosis, 96
chemistry of tachycardia, D, 101
Glasgow, W. C., temperament and the consumptive's choice of location, 199
Glengarriff, Ireland, as a resort, C. E. Nammack, 26
Goebersdorf statistics, 281
Gravenhurst, Canada, town of, mortality from phthisis in, 282

Hance, I. H., breathing exercises, D, 260
cerebro-spinal meningitis, D, 70
empyema of long standing, recovery, 287
Hawaii, climate of, beneficial for nephritis, H. Sewall, 118
Hawk, P. B., on water-drinking in relation to nitrogen and phosphorus excretion, 147
Heart, dilatation of the, Beverley Robinson, 71
Heart in pulmonary tuberculosis ; tachycardia, W. M. Gibson, 96
Heart-block, case and autopsy, G. R. Butler, 102
Hiland, Thomas, empyema and aspiration, D, 291
Hinsdale, Guy, influence of hydrothermic therapy on the pulse rate, D, 159
His, William, jun., anatomy of the heart, 102
Hot bath, the morning, Norman Bridge, 166
Humidity, influence of, on nephritis, W. F. R. Phillips, 292
Hydrotherapy in acute nephritis, C. C. Ransom, 144
Hydrotherapy in chronic nephritis, 146
Hydrotherapy, influence on the hæmoglobin, 153

Influenza, a cause of rapid cardiac dilatation, B. Robinson, 82
Irish Riviera, described, Chas. E. Nammack, 26

Kidney disease, ocular symptoms of, S. D. Risley, D, 162
Kidney disease, balneology for, 141
Kidney, movable, 129
Kyle, D. Braden, tuberculosis and diphtheria, D, 248
tuberculosis and syphilis, 249

Lakewood, N.J., temperature and sunshine in, October to May, 1900-1905, W. G. Schauffler, 48
Light, radiant, energy, W. D. Robinson, 172
Locomotor ataxia, treatment with artificial Nauheim baths and Fränkel movements (chart), P. K. Brown, 113
Loomis, H. P., the systematic study of climatology in the medical schools, 7

Marvel, Philip, uses of water and heat in renal diseases, 150
warm and hot baths in renal and arterial disease, D, 165
Metabolism, problems in, 121, 122
Metabolism and climate, Boardman Reed, 180
Minor, C. L., the apical outline as an aid to diagnosis in pulmonary tuberculosis, 185
diaphoresis in nephritis, electric light cabinet, 160
empyema and evacuation, D, 290
gymnastic exercises in tuberculosis, D, 261
rooms preferable to tents, 233
Mortality from tuberculosis near sanatoria, J. H. Elliott, 280
Muskoka Sanatorium, J. H. Elliott, 283
Myocarditis, treatment with artificial Nauheim baths (chart), P. K. Brown, 113

Nammack, Charles E., Irish Riviera, 26
Nauheim baths in chronic heart cases, P. K. Brown, 108
Nauheim salts, method of preparing artificial baths, P. K. Brown, 108
Nauheim method, difficult at home, 84, 86
Nephritis, balneology in, 141
Nephritis, influence of barometric pressure on, H. Sewall, 117, 123
Nephritis, influence of wind, temperature and humidity, on, W. F. R. Phillips, 292
Nephritis influenced by temperature, humidity and wind, W. F. R. Phillips, 292
New Jersey climate and nephritis, D, 158

New York City, methods of the Board of Health in dealing with cerebro-spinal meningitis, 56
New York State Hospital for tuberculosis, J. H. Pryor, 257, 279
Nitrites and nitro-glycerine in acute cardiac dilatation, B. Robinson, 75
Nitro-glycerine, P. K. Brown, 112

Obesity treated with artificial Nauheim baths (chart), 111
Ocular manifestations of kidney disease, S. D. Risley, D, 162
Orthodiagraph for studies on the heart, J. H. Pratt, D, 94
Osmosis of waters, 35

Philadelphia, tuberculosis in, R. A. Cleemann, 275
Phillips, W. F. R., influence of variability of wind, temperature and humidity on nephritis, 292
Pneumonia treated by fresh air, J. M. Anders, 262
Pottenger, F. M., Davos as a resort, D, 285
importance of "Splitter" as an aid to diagnosis, 193
pneumonia epidemic in tuberculosis sanatorium, D, 249
tachycardia in early tuberculosis, is it toxic? D, 100
tents and rooms compared, 233
Pratt, J. H., electric light cabinet, D, 162
orthodiagraph, studies on size of heart, 94
Pryor, J. H., death-rate near sanatoria, D, 285
deep breathing in lung diseases, 251
segregation of consumptives by the State, 278
tachycardia in advanced tuberculosis different from that in early cases, D, 100
Pulmonary tuberculosis, advanced cases, care of, S. G. Bonney, 215
Pulmonary tuberculosis, diagnosis by apical outline, C. L. Minor, 185
Pulmonary tuberculosis, diagnosis by "Splitter," 193
Pulmonary tuberculosis, tachycardia in early stage, W. M. Gibson, 96

Ransom, C. C., balneology in relation to renal disease, 141
baths in cases of arterio-sclerosis, D, 165
Reed, Boardman, atony of the stomach and water-drinking, D, 161
climate and metabolism, 180
Renal disease, balneology in, C. C. Ransom, 141
Renal disease in relation to temperature, wind and humidity, F. R. Phillips, 292
Renal diseases, uses of water and heat in, 150
Rest in pulmonary tuberculosis, S. G. Bonney, 220
Rheumatism and weather, E. L. Shurly, 3

Risley, S. D., ocular manifestations of kidney disease, D, 162
Robinson, Beverley, some forms of acute cardiac dilatation, 71
Robinson, W. Duffield, light, radiant energy, 172
Running races and heart failure, B. Robinson, 89
Rutland, Mass., town of, statistics of mortality from tuberculosis in, J. H. Elliott, 281

Salicylates in rheumatism, place of, R. H. Babcock, D, 93
Schauffler, W. G., case of empyema, D, 288
temperature and sunshine in Lakewood, N.J., October to May, 1900-1905, 48
Schmith's table of organic and inorganic constituents of the human body, 38
Segregation of consumptives, R. A. Cleemann, 274
Sewall, Henry, influence of barometric pressure on nephritis, 117
Shurly, E. L., President's address, 1
Southern health resorts, winter, T. D. Coleman, 51

"Splitter" (bacilli), an aid to diagnosis, F. M. Pottenger, 193
St. Moritz, Engadine, Switzerland, A. C. Klebs, 12
Stengel's case of heart-block, or Stokes-Adams disease, quoted, 104
Stokes-Adams disease, G. R. Butler, 102
Stomach, atony of, in relation to water-drinking, Boardman Reed, D, 161
Summerville, South Carolina, 53
Sunshine in tuberculosis, S. G. Bonney, 221
Syphilis and tuberculosis, D, 249

TACHYCARDIA of early pulmonary tuberculosis, W. M. Gibson, 96
Tachycardia, paroxysmal, P. K. Brown, 114
Taylor, J. Madison, rational treatment of the visceral ptoses, 127
Temperament a factor in deciding on a location for consumptives, W. C. Glasgow, 199
Temperature and sunshine in Lakewood, N.J., October to May, 1900-1905, W. G. Schauffler, 48
Temperature, variability of, influence on nephritis, W. F. R. Phillips, 292
Tobacco, action on the heart, P. K. Brown, 110, 111
Tobacco heart, B. Robinson, 72, 91
Tuberculosis mortality near sanatoria, J. H. Elliott, 280
Tuberculous patients, segregation by the State, R. A. Cleemann, 274
Turck, F. B., etiology of enteroptosis, quoted, 128

VENOUS blood pressure increased on going to an altitude, 122
Visceral ptoses, rational treatment of, J. Madison Taylor, 127
von Noorden on water-drinking in acute nephritis, 143, 145

WALKER, J. B., water an indispensable remedy for renal disease, D, 161
Water and heat in renal diseases, 150
Water, use of, in acute nephritis, views of Osler, Senator, Croftan, and von Noorden, 142
Waters of Fiuggi, Italy, Carlo Colombo, 34
Wilson, J. C., empyema and aspiration, 290
Wind influencing nephritis, W. F. R. Phillips, 292
Winter health resorts, T. D. Coleman, 51

X-RAYS, radiant energy, W. D. Robinson, 172

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GENERAL INDEX.

Volumes I–XXI.

Roman numerals indicate the volume. D indicates remarks in discussion.

Abbott, A. C., Asiatic cholera, X, 81
Abbott, George E., individuality the basis of rational climato-therapy, VI, 269
southern California foothills, XVIII, 93
Abrams, Albert, immobilization of the lungs, XVIII D, 88
Acclimatization of consumptives to the climate of Colorado, VII, 183
Acclimatization, Eskridge, VIII, 98
I. H. Platt II, 104
Acoustics, XX, D, 256
Acetanilid, V, 82
(antifibrin) sweating produced by, IV, D, 51
Aconite in hemoptysis, XII, 109
Acute miliary tuberculosis, Monro, V, 14
Adenitis, Ingals, XII, 71
Adirondacks, II, 87
cases cured, VIII, 65
climate of, XIV, 36
Cottage Sanitarium at Saranac, VI, 170
the southern, E T Bruen, III, 202
sanitarium, V, 78
Adirondack Cottage Sanitarium, XII, 31
tenth annual report, XI, 30
infectiousness of dust in, Hance, XII, 46
Anders, XIV, 158
Adirondack mountains, N. Y., XII, 268
Aerial transportation of malarial germs, Newton, XI, 91
Aero-therapy, XII, 7
Aero-therapeutics, Knopf, XIII, 115
Aerozal, X, page xiii
Aetna Springs, Calif., 254
African malaria, X, 393
Stanley, XI, 99
statistics, II, 88
Age in hereditary and acquired phthisis, Solly, XI, 17
mortality at different ages, VI, 33
Agnes Memorial (Phipps) Sanatorium, Denver, C. E. Edson and W. H. Bergtold, XX, 164
Aiken, S. C., XI, 224
Geddings, III, 173
Air and light in Colorado, Gardiner, XV, 19
Air, compressed, V, 126
impure, I, 75
night, II, 70
of forests, V, 129

pressures, abnormal intrathoracic, and their treatment, VII, 6
and ventilation, XVI, 32
expired, XVI, 48
exhaled from consumptives, XII, 54
of Mt. Pocono, Pa., XII, 84
purity of, Santa Barbara, Calif., XX, 24
pure, II, 69
mountain, V, 78
warm, dry, moist, aseptic, VI, 116
Ajaccio, climate of, A. Tucker Wise, VII, 271
Alabama resorts, XII, 248
Albuquerque, N. M., XI, 212
Alcohol, II, 68
abuse of, in phthisis, V, 73
Alcoholism in Colorado, Eskridge, VII, 171
Alcoholic myocarditis, Elsner, XII, 145
Alden, Genl. C. H., U. S. A., retired, some southern California health resorts, XXI, 44
Alimentation in lung disease, Reed, X, 218
Allen, H., quinsy, D, X, 164
Shurly Gibbes, treatment of tuberculosis, D, IX, 88
Altitudes, high, effects on cardiac diseases, A. L. Loomis, III, 1; Donaldson, IV, 52
hyperpyrexia in, Keating, IX, 11
return of cured patients from high, Knight, VII, 189
air in high, aseptic, IV, 111
descent from high, for patients, Rogers, VII, 204
diphtheria at high, Chapman, VI, 206
effects of extreme, VI, 112
and the blood count, Campbell and Hoagland, XVII, 107
Altitude, blood changes induced by, Solly, XV, 144; XVI, 204
advantages and disadvantages of in phthisis, XII, 8
no disadvantage in hemoptysis, XII, 9
and blood pressure, Gardiner and Hoagland, XXI, 80
in Arizona, 92
in relation to neuralgia, Pearce, XIX, 42
in fact and fancy, Henry Sewall, XVIII, 186
I, 35
in tuberculosis, hereditary influence, Moore, VIII, 269
influence of on sexual organs of women, W. A. Jayne, XI, 120
temporary effects of high, Eskridge, VII, 175
circulatory changes in, V, 96
diphtheria at high, Jayne, VIII, 169
in affections of the heart, Knight, IX, 16
indications for and contra, indications, V, 50
and heart disease, Babcock, XIX, 33
low and high, as influencing disease, Swan, XVIII, 222
nervous cardiac symptoms in high, XVIII, 196
Alpine resorts, Ruedi, X, 28
Alps, diphtheria in the, Chapman, VI, 206
American health resorts, practitioners at, XVII, 238
invalid contrasted with the English invalid, Solly, VII, 142
Ambler, C. P., Klebs' treatment of cervical adenitis, D, XII, 78
Amherst College, physical training in, XIV, 43
Ammonia in expired air, Bergey, XII, 54

Ancon Hospital, XXI, 33
Anders, Howard S., functional murmurs, D, XV, 253
influenza epidemic in Philadelphia, Pa., 1898-99, XV, 286
pitch of the normal pulmonary valve sound and changes in pneumonia and emphysema, XX, 198
relation of sunshine to influenza, XVIII, 26
Anders, J. M., heart disease and brain disease, XX, D, 91
hyperchlorhydria in tuberculosis, D, XVI, 142
the value of tuberculin in the diagnosis of pulmonary tuberculosis, XVI, 89
meteorologic conditions in the causation of lobar pneumonia, XX, 204
prognosis in tuberculous pleurisy, X, 113
seasonal influences in erysipelas, X, 43
temperature and atmospheric humidity and their relations to health and disease, V, 127
sanatoria and special hospitals for the poor consumptives, XIV, 154
tuberculin test, XVII, 123
Anderson, B. P., intermediate altitude for the consumptive invalid, XV, 87
Aneurism of aorta, sign of, Glasgow, X, 324
of the abdominal aorta, R. G. Curtin, XVII, 234
of the thoracic aorta, five cases, H. D. Arnold, XVII, 245
of the aorta, T. Darlington, Jr., XV, 218
as detected by the fluoroscope, F. H. Williams, XIV, 117
of the thoracic aorta, J. Daland, XIV, 66
of the heart, with thrombosis of the left coronary artery, Judson Daland, XVI, 190
simulated by pulmonary anthracosis, Henry Sewall, XXI, 190
Angina, Elsner, XII, 142
pictoris, Babcock, X, 304
following heavy blows, etc., Curtin, X, 9
influenzal, IX, 51
Angicourt, France, projected institution for consumptives, XI, 29
Anthracosis simulating thoraric aneurism, Henry Sewall, XXI, 190
Anticyclone, XV, 304
Antipyretics, V, 82
in phthisis, II, 76
acetanilid, IV, 50
Antiphthisin in cervical adenitis, Ambeer, C. P., XII, 78
in pulmonary consumption, H. L. Taylor, XI, 74
Antiseptic treatment of pulmonary tuberculosis, Ingals, XIII, 1
Antistreptococcic serum, J. E. Stubbert, XIV, 220, 222
Antitoxin in diphtheria, Brannan, XI, 176
Antitubercle serum in the treatment of tuberculosis, case reported, Hinsdale, XIII, 97
Aortic aneurism, Darlington, XV, 218
Apoplexy in Colorado, VII, 179
seasonal relations of, VI, 79
Aquzon, X, page xii
Asthma, clinical notes on, Beverley Robinson, XIV, 80
reflex causes of Beverley Robinson, XIV, 83
treatment by nitroglycerin, D. Johnson, XIV, 91
Atelectasis, Denison, VII, 23
Atkins, F. H., medicated inhalations useful, D, VII, 71
nasal and pharyngeal catarrh in New Mexico, D, VII, 258
New Mexico, VII, 239
Atmosphere, dry, effect on laryngitis and catarrh, Ingals, VII, 254

Arctic service not followed by renal disease. Holt, XIII, 33
Arizona, XII, 250
climate, M. A. Rodgers, XII, 86
climate of, Wm. G. Burns, XVIII, 241
resorts, Solly, XIII, 171
climate of, VIII, 235
Southern, Yandell, VII, 81
Armor, S. G., pneumatic differentiation, D, II, 64
Arnold, H. D., cardio-therapeutics, D, XVIII, 144
malignant endocarditis difficult to diagnosticate, D, XVII, 407
effects of violent exercise on the heart, XV, 267
Arrow Lakes, B. C., XVIII, 179
Arteriosclerosis, Trunecek's treatment of, XIX, 241
Arthritic diseases, mineral waters in, V, 229
Arrested cases of phthisis treated at Sharon, V. Y. Bowditch, XV, 53
Aseptic climate, V, 100
Ashburner, C. A., geology of Pennsylvania, III, 90
Asheville, N. C., XII, 271
sanatorium at, XII, 41
Aspiration in empyema, VIII, 135
Asthma and emphysema, Denison, VII, 32
bronchial, Knight, VI, 159
causation and treatment of, B. Robinson, VI, 139
in California, XVII, 91
epileptic form (Paulet), Robinson, VI, 157
nasal and neurotic factors, V, 178, 184
surgical treatment of, Robinson, VI, 152
treatment by diphtheria antitoxin, V. Y. Bowditch, XIV, 90
Astringents in hemoptysis, Walker, VI, 124
Atlantic City, N. J., II, 88; XI, 209
XVII, 54
dryness of soil and atmosphere, XV, 102, 104, 107
Atmosphere in relation to skin, XV, 128
Atropine in hemoptysis, XII, 129
Auenbrugger, XIV, 1
Augusta, Ga., Coleman, XXI, 65
XI, 203
climatology of, T. D. Coleman, XVII, 29
Ausculation, XIV, 1
Autopsies proving the curability of phthisis, I, 85
Avalanche, loss of life by, in Colorado, XV, 305

Babcock, R. H., control of tuberculosis, moderation in, D, XXI, 142, 144
danger from sputum, D, XXI, 125
hemoptysis in heart disease, D, XXI, 187
beri beri, X, 385
cabinet, III, 38
clothing regulated by sensible temperatures, D, X, 373
creosote and guaiacol, D, X, 283
early advice in hereditary cases of phthisis, D, XI, 26
consumption in Colorado, D, XVI, 58
nitrogen gas injections in tuberculosis, D, XVI, 61
delay in sending tuberculous patients away, D, XV, 38
high altitude and heart disease, XV, 259
linen underclothing, D, XV, 124

gout, D, XIII, 220
iced drinks and sunstroke, D, XIII, 234
Maine climate, D, XIII, 37
management of consumption, XIII, 65
heart lesions, D, XII, 155, 160
pulmonary stenosis, D, XII, 171
treatment of hemoptysis, XII, 125
medical gymnastics, XX, D, 268
Schott treatment, XX, D, 269
milk a cause of tuberculosis, XX, D, 111
pus infection similating pulmonary tuberculosis, XX, 115
pulmonary tuberculosis, XX, D, 122
oxaluria, D, XVII, 261
the limitation of drug therapy, XVII, 1
contagiousness of pulmonary tuberculosis, XVII, 318
treatment of phthisis, D, XVII, 230
nitroglycerin for pneumonia, D, XV, 195
prognosis in valvular lesions of the heart, D, XV, 185
food in phthisis, danger of hemoptysis, D, X, 232
pleurisy with effusion, D, XI, 144
report of cases of chronic heart disease treated by the Schott method of baths and gymnastics, X, 298
unusual forms of cough, D, XI, 173
winds of Chicago, D, X, 366
remarks and queries concerning the influence of altitude on heart disease, XIX, 33
sanatoria, XIX, D, 150
winter climates, XX, D, 60
delirium in heart disease, XX, D, 87
Bacilli of tubercle, Bowditch, XII, 47
in phthisis, Loomis, D, X, 281
of tubercle, Curtin, D, X, 274
significance of absence or pusence in sputum, Robinson, D, XI, 84
Bacillus of tuberculosis, VII, 263
tuberculosis, clinical value of the products of, von Ruck, XIII, 74
Bacteria in filtered waters, W. D. Robinson, XII, 195
Bacterial invasion in tuberculosis, Tendean, IV, 131
Bacterio-therapeutics, with especial reference to tuberculosis, E. R. Baldwin, XVI, 64
Baker, H. B., meteorology and lung disease in Colorado, VII, 210
need of more accurate data on climates, D, VII, 99
pneumonia, III, 220
Baldwin, E. R., blood changes in high altitude, Bergtold, D, XVI, 205
expense of small sanatoria for consumptives, D, XVI, 124
bovine tuberculosis, XX, 111
bacterio-therapeutics, with especial reference to tuberculosis, XVI, 64
dampness and tuberculosis, D, XVI, 27
tuberculin test in joint diseases, D, XVI, 104
handkerchiefs for consumptives, XIV, 211
infection from the hands in phthisis, XIV, 202
sero-therapy in tuberculosis, D, XIV, 229
hemoptysis affected by season and altitude, D, XVII, 104
syphilis and tuberculosis, D, XVII, 152
tuberculin test, D, XVII, 138
need to individualize for needs of patients as to sanatoria, etc., D, XVII, 234

return of patients after cure in Colorado successful, VII, 196
sanitarium supervision for patients, D, VII, 162
effect of change of posture upon heart murmurs, IX, 8
note on antifebrin in phthisis, D, IV, 51
pneumatic treatment, D, VII, 69
cabinet, D, IX, 49
History of cases of tuberculosis treated at the Sharon Sanitarium, Mass., 1892-1902, XIX, 64
fever in phthisis, XIII, D, 69
hospital for consumptives in Boston, XIII, D, 151
Maine coast and south shore of Massachusetts, D, XIII, 25
tuberculosis in Maine, XIII, 27
infection from the hands in phthisis, D, XIV, 209
Röntgen-ray examinations, D, XIV, 144
empyema, D, XV, 225
subsequent histories of arrested cases of phthisis treated at Sharon Sanitarium, XV, 53
results in ninety cases of pleurisy with special reference to the development of pulmonary phthisis, VI, 1
dampness of soil and air, X, 147
Rutland Sanatorium, XVIII, D, 24
sanatoria at Rutland, Mass., and Pdyllwild, Calif., XVIII, 133
"sanitarium" and "sanitorium," XVIII, D, 184
Sharon Sanitarium, D, VI, 181
three years' experience with sanitarium treatment of pulmonary diseases near Boston, X, 254
tuberculosis pleurisy, D, X, 112
sea air, D, IV, 36
suggestions: the result of recent experience with phthisical patients, XIV, 28
treatment of asthma by diphtheria antitoxin in injections, D, XIV, 90
use of alcohol in heart disease, XVIII, D, 144
Brady cardia as a symptom, Roland G. Curtin, XIX, 252
Brain and cord lesions in Colorado, Eskridge, VII, 176
Chronic, degeneration in Colorado, VII, 178
Brannan, John Winters, antitoxin in diphtheria, XI, 176
breathing exercises in phthisis, D, X, 250
Colorado resorts, D, X, 41
communicability of tuberculosis, X, 293
California climate, D, XVII, 93
sea air treatment of tuberculosis of the bones and glands in children, XXI, 107
Calomel in diphtheria, D, XIII, 212
sunstroke, D, XIII, 234
fibrinous bronchitis, XII, 186
home treatment of tuberculosis by means of hospital dispensaries, XX, 149
lesions of mitral valve, D, XVI, 184
tuberculin test defined, D, XVI, 101
tuberculin test in surgical cases, D, XVI, 103
quinsy and its treatment by early incision, X, 151
seasonal influence in erysipelas, X, 54
treatment of cholera, etc., by state, D, X, 104
treatment of pneumonia, XIX, 181
Breathing exercises in phthisis, D, X, 250
exercises, Newton, XIX, 195

Brehmer, V, 80
Bridge, Norman, president's address, XIX, 1
coughing at the end of expiration, D, XXI, 160
immobilization of one-half the thorax, D, XXI, 216
impalpable sputum a usually overlooked danger in pulmonary tuberculosis, XXI, 120, 133, 146
the climate of southern California, XVII, 85
mortality of Augusta, Ga., D, XVII, 36
phlebitis in advanced phthisis, D, XVI, 133
Briggs' canula for treating cervical adenitis, XII, D, 77
Bright's disease and asthma, Beverley Robinson, XIV, 88
disease and climate, XV, 99
disease, rare in New Mexico, VII, 240
statistics, VII, 240
Wilson, V, 109
British Balneological and Climatological Society, XII, XXVII
British Columbia, XVIII, 171
Brompton Hospital, XI, 28
statistics, Ruedi, X, 144
mortality from phthisis among attendants, Small, XII, 47
Bronchial asthma, summer treatment of, Beverley Robinson, XVIII, 233
hemorrhage, C. E. Quimby, XII, 106
irritation in Colorado, Bonney, XIII, 166
tubes and lungs, local treatment of, IV, 95
tubes, respiratory movements of, XXI, 152
Bronchiectasis in the tuberculous, Solly, XIX, 207
Bronchitis, fibrinous, Brannan, XII, 186
in New Mexico, VII, 246
Broncho-pneumonia a cause of death in diphtheria, Brannan, XI, 180
Bronchus, foreign body in, XVII, 155, 158
Brower, D. R., climate in its relations to diseases of the nervous system, XIII, 46
Brown, Lawrason, weather observations in the Adirondacks, XX, 38
Brown, Sanger, influence of climate in nervous diseases, XIII, 41
ventilation and tuberculosis, D, XIX, 131
Browne on aneurismal rupture, XVII, 346
Bruce, J. Mitchell, on strychnine, XVII, 383
Bruen, E. T., Bergeon's treatment, IV, 71
dryness, D, V, 68
evergreen forests, D, V, 116
sea air, D, IV, 36
the relative importance of different climatic elements in the treatment of phthisis, V, 36
the southern Adirondacks, III, 202
Buchanan, phthisis and soil, III, 89
Buhl, I, 17
Bulkley, L. D., relative value of linen and woolen clothing, D, XV, 123
renal disease treated by milk, D, XV, 106
skin diseases and climate, XV, 108
Burlington, Vermont, XII, 282
Burns, William G, climate of Arizona, XVIII, 241
Butler, Glentworth R., note upon the treatment of lobar pneumonia, XIX, 168, 183
note upon the position of the lower border of the heart, XIV, 61
New Jersey as a health resort, D, XIV, 185
diabetes, D, X, 321

Climates, artificial, Cohen, IV, 117
choice of, Knight, D, IV, 130
Climatic factors secondary to individuality as a basis of climato-therapy, VI, 270
maps, Denison's, II, 78
Climatology as a study in medical schools, S. E. Solly, XX, 7
of the Laurentians, Canada, A. D. Blackader, XXI, 55
of California, Prof. Alex. G. McAdie, XVIII, 103
of nudity, W. D. Robinson, XIV, 231
Climato-therapy, difficulties of, J. B. Walker, XII, 1
Clark, Sir Andrew, tribute to, XV, 18
Clothing, II, 146 (see Dress.)
Judd, XV, 118
disinfected from cholera, X, 89
for tuberculous patients, XIV, 232
for tuberculosis patients, Minor, XVII, 298
for the consumptive, Hance, XVII, 198
suitable for use in California, XVII, 92
Cloudiness, maps of mean, I, 41
relative, II, 79
Cobb, J. O., is milk a factor in the spread of tuberculosis, XX, 100
pneumonia a cause of pulmonary tuberculosis, D, XX, 122
the point of election in pulmonary tuberculosis, XVIII, 50
tuberculosis and milk, D, XX, 112
Cocaine-habit, Bosworth, XI, 136
condemned in the treatment of asthma, Blackader, Musser, Coleman, D, XIV, 93
Cod-liver oil, II, 72
in phthisis, VI, 187
Cohasset, Mass., XIII, 25
Cohen, S. S., atmospheric pressure, IV, 57
Bergeon's treatment, IV, 57
pine forests and artificial climates, IV, 177
Cold wave of February, 1899, Guy Hinsdale, XV, 304
Coleman, T. D., aneurism of the heart, XVI, 198
calomel in diphtheria, D, XV, 200
renal disease rare in Georgia, D, XV, 103
climatology of Augusta, Ga., XVII, 29
cocaine condemned in the treatment of asthma, D, XIV, 93
malaria, D, XI, 107
North Augusta as a winter health resort, XXI, 65
physical examinations in all cases, D, XIV, 37
Colon, Panama, XXI, 3, 35
Colorado, acclimation to the climate of, H. O. Dodge, VII, 183
all cases cured there need not remain there, Knight, VII, 195
141 cases of phthisis treated in, Solly, VII, 132
air and light in the treatment of consumption, XV, 19
climate of, B. P. Anderson, XV, 88
climate and female sexual organs, Jayne, XI, 120
of, as applied to the arrest and cure of pulmonary disease, Fisk, V, 11
of, Jayne, V, 55
climate and pulmonary hemorrhage, Bonney, XVII, 97
cures of phthisis in, Gardiner, XVII, 204
Otis, XVII, 220
endocarditis in, Fisk, XVI, 185
tuberculosis problem in, S. G. Bonney, XVI, 49

cure in, as permanent as cure elsewhere, Solly, VII, 196
hysteria in, Eskridge, VII, 179
incipient cases of tuberculosis, Moore, XI, 41
institutions for consumptives, XI, 31
power for work in, Eskridge, VII, 165
relation of meteorological conditions to lung diseases, etc., Baker, VII, 210
requisites for closed sanitarium in, Kellogg, VII, 107
meteorology, Fisk, X, 352
mineral springs of, Denison, VI, 212
nervous diseases in, Eskridge, VIII, 98
and mental diseases in, Eskridge, VII, 163
phthisis, temperature and humidity in, Baker, VII, 212
practice in, Swan, XVIII, 224
pulmonary tuberculosis in, Bonney, XIII, 153
resorts, XI, 198
compared with Alpine resorts, Ruedi, X, 28
sleep and insomnia in, Eskridge, VII, 166
resorts, Solly, XIII, 171
return from, in case of consumptives, Bonney, XVIII, 203
Sanatorium treatment of tuberculosis in, XVIII, 182
school children, measurements of, Gardiner, XIX, 258
Springs, Solly, XIII, 181
Springs, XI, 199
climate of, Solly, IV, 173
invalids suited for treatment at, Solly, V, 23
tuberculosis in, Moore, VIII, 271
250 cases of phthisis treated in Colorado, Solly, XI, 10
tuberculous meningitis in, Eskridge and Solly, VII, 176, 181
Coma, diabetic, Weber, X, 315
Community and tuberculosis, XIX, 133
Compressed air, V, 26
and rarefied air in the treatment of pulmonary diseases, J. Solis-Cohen, I, 59
Complications of pneumonia, Coleman, XIX, 161
Coney Island, Sea Breeze Hospital at, XXI, 108
Congenital narrowing of the mitral orifices as a cause of dwarfed lives and irritable heart, R. G. Curtin, XII, 161
Consumptive and tubercular, F. J. Knight, XIV, 25
Consumptives in Colorado; return home, Bonney, XVIII, 203
Consumption as I have known it, Hurd, VI, 182
management of, R. H. Babcock, XIII, 65
Contagion of phthisis, I, 83; III, 108
Contagiousness of pulmonary tuberculosis, E. L. Shurly, XVII, 312
Convalescent stage of phthisis, Mays, X, 65
Convalescents, sea voyages for, Gihon, VI, 60
Coolidge, A. Jr., mortality of acute lobar pneumonia, VI, 22
Cornet's observations on micro-organisms, V, 105
researches, X, 289
Corpulence, relation of weight to height, XIV, 50
Corsets, XIX, 235
Corset-wearing, Kellogg, VII, 63
Corsica, climate of, Wise, VII, 271
Corvisart, XIV, 6
Cottage, plan of treatment, VI, 166

Cough, etiology and treatment of, B. Robinson, XI, 161
treatment of, in last stage, IV, 50
Cough syrups, cod-liver oil and creosote mischievous, F. J. Knight, XIV, 26
Councilman, bacillus of tubercle, V, 95
Creasote, X, 275.
inhalations, D, X, 251
in phthisis, Glasgow, VIII, 262
in phthisis, XIII, 17
in phthisis, L. Weber, XVII, 189, 192
Criminals, tuberculosis in, W. D. Robinson, VII, 317; Hinsdale, XXI, 100
Croup, relieved by oxygen inhalations, A. H. Smith, XIV, 157
Crudeli, Tomasi, malaria, XI, 98
Culebra Pass, Panama, view of, XXI, 12
Cure of tuberculosis, time needed for, Minor, XVII, 307
of tuberculosis, value of the term, XXI, 99
Cures defined, XVII, 173
Curry, J. J., XIV, 33
Curtin, R. G., the action of strychnine on the heart and the evil of overdosage, XVIII, 139
anæmic necrosis in the walls of the left ventricle of the heart, XVII, 338
aneurism of the abdominal aorta, XVII, 334
aneurism of the heart, D, XVI, 198
Denver and tuberculosis, D, XVI, 59
the phlebitis of advanced phthisis, XVI, 126
Rocky Mountain fever, III, 190
address, X, 3
angina pectoris following heavy blows on the præcordium, etc., X, 9
climate an etiological factor in Graves' disease, V, 84
association of tuberculosis and syphilis, D, XVII, 151
cause of death in aneurisms of the aorta, D, XVII, 380
hemoptysis not affected by altitude, D, XVII, 105
bradycardia as a symptom, XIX, 252
cardio-œsophageal gush and click, XV, 203
horseback for pleuritic adhesions, D, XV, 184
climate of Mexico, XIII, D, 20
climatology of chronic hemoptysis, VI, 111
diarrhœa and mucous discharges, D, XI, 118
early diagnosis of aneurism, X, 330
epidemic influenza in Philadelphia, VIII, 109
congenital narrowing of the mitral orifices as a cause of dwarfed lives and irritable heart, XII, 161
influenza and endocarditis, XII, D, 182
delirium noticed in heart disease, XX, 81
dyspnœa at sea level and at high altitudes, XVIII, 195
diet in heart disease, D, XVII, 260
home treatment and climatic treatment compared, D, XVII, 233
largest recorded aneurism of the heart, XVII, 328
interventricular aneurism opening into the right ventricle, XVII, 334
general advice as to medication, travel, etc., D, XIV, 35
ergot in malaria, D, XIV, 108
influence of respiration upon the heart's action, XIV, 72
erysipelas, D, X, 55
influenza and catarrhal fever, VIII, 88
influenzal contagion, VIII, 221
injection of iodine in pulmonary cavities, D, VIII, 70
is herpes zoster a cause of pleurisy and peritonitis? VII, 101
leprosy in Philadelphia, D, VIII, 243

phenolic substances; nascent phenic acid, carbolic acid, creosote, guaicol, and benzoyl of guaracol. X, 275
Mt. Pocono, Pa., XII, 85
obituary notice of Dr. W. W. Johnston, XVIII, 267
peculiarities of asthmatic patients, D, XIV, 91
Rontgen-light examinations, D, XIV, 144
prognosticating heart disease, D, XV, 184
rupture of the heart from a fall, D, XV, 239
report of the delegates to the Fourth Pan-American Medical Congress to Panama, XXI, 1
registration of cases of tuberculosis, D, X, 294
rest in heart disease, D, VI, 266
sea air, IV, 31
sulphuretted water in phthisis. sulphur waters for phthisis, D, VIII, 166
treatment of acute rheumatic endocarditis, XXI, 177
significance of hemoptysis in heart disease, XXI, 181
spread of tuberculosis, D, XXI, 141
tachycardia, uremia and Graves' disease, XIII, 238
temporary diabetes, D, X, 323
the action of influenza poison on the heart, and a study of influenzal angina pectoris, IX, 51
the transmission of abnormal sounds of cardiac, pericardiac, and aortic origin ,a cause of murmurs in the subclavian region, XI, 86
treatment of pneumonia and mortality, XX, D, 250
unreasonable fear of consumptives, XIX, 149
Cyclone, XV, 304
Cyrtometer for diagnosis and prognosis, Minor, XIX, 221

DaCosta, J. M., cardiac murmur, Curtin, XII, 165
Daland, Judson, aneurism of the heart, with thrombosis of the left coronary artery, XVI, 190
a case of endocarditis, D, XVI, 184
blood changes in high altitudes (Prague), D, XVI, 206
Iceland and tuberculosis, XVI, 172; D, XVI, 27
cold bathing, D, XV, 124
digitaline, D, XV, 195
different foods required in different climates, D, XV, 104
exudates in pleurisy, D, XI, 145
family phthisis, III, 105
malaria, D, XI, 110
three cases of beri beri, X, 375
treatment of cholera by hypo-dermoclysis and enteroclysis, X, 92
malignant ulcerative valvutitis, XVII, 401
phthisis and fecal fermentation, D, XI, 118
respiration and the heart's action, D, XIV, 79
sunlight as a therapeutic agent, D, XIV, 238
dissecting aneurism of the thoracic aorta; rupture into pericardial sac; death, XIV, 66
malaria, D, XIV, 106
sanatoria for the tuberculosis, XIX, D, 84
treatment of lobar pneumonia, XIX, 179
technique of blood examinations, D, XV, 155
Daly, W. H., carbolic acid, iodine and iodoform in phthisis, XIII, 71, 72
malaria a water-borne disease, X, 388
nasal disease, D, V, 189
wakefulness of neurasthenia as affected by seaside residence, VI, 246
obituary notice of, XVII, p. xxv

Dampness of the soil as a factor in the production of human tuberculosis, XVI, 15
and tuberculosis, XVI, 23
Danforth, J. N., renal diseases as affected by climate, XIII, 30
Darlington, Thomas, aneurism of the aorta, XV, 218
calomel in diphtheria, D, XV, 202
two factors underlying disease in New York City, XI, 112
the doubtful efficacy of a hot, dry climate in disease, VIII, 234
a method of cooling water in hot climates, IX, 23
lymphatism, D, VIII, 259
malaria in New York City, D, XI, 108
resorts for phthisical, D, X, 138
Seton Hospital for Consumptives, D, XI, 40
negroes, tuberculosis and syphilis, XIX, D, 130
nitroglycerine in the treatment of pneumonia, XIX, 182
sanatoria in treating consumptives, XIX, D, 146
the work of the tuberculosis clinic of the health department of New York City, XX, 143
Davis, N. S., Jr., a case of endocarditis, D, XVI, 184
unhygenic surroundings a factor in developing tuberculosis. D, XVI, 26
climatology as a study in medical schools, XX, D, 10
deaths from renal disease in various states, D, XV, 106
out-of-door exercise or consumptives, D, XV, 28
prognosis in chronic valvular affections of the heart, XV, 174
X, 28; D, V, 67, 73
St. John Roosa, V, 221
Deaths by freezing, XV, 305
Death-rate from tuberculosis falling in Philadelphia, XI, 35
from phthisis growing in open resorts, XII, 30
Death Valley, California, XIX, 27
Deep-breathing, R. C. Newton, XIX, 195
Degeneration, results of deficient ventilation, XVI, 29
Delafield, F., on hemoptysis, D, XII, 112
Delaware Water Gap, Monroe Co., Pa., Judd, XII, 79-273
Delepine & Ransome, germicides for bacilli, XII, 47
Delirium noticed in heart disease, Curtin, XX, 81
Denison, Charles I, 22; II, 78
address, VII, 1
air-pressures, intrathoracic, VII, 1
altitude, D, V, 67
care of consumptives in Colorado, D, VI, 179
Colorado mineral springs, climate, etc., VI, 212
immobilization of one-half the thorax, XXI, 201
fixation of chest in treating tuberculosis, D, XVI, 62
intrathoracic pressure and a method of lung immobilization, XVIII, 77
climate of Salt Lake Basin, D, VII, 80
pneumatic cabinet, D, IX, 50
specific gravity of urine at high altitude, D, VII, 253
statistics of consumption and temperature, D, VII, 232
Western life for phthisis, D, VI, 202
Denver, Colorado, Phipps Sanatorium, XX, 164
XI, 198
and tuberculosis, D, XVI, 59
tuberculosis in, Bonney, XVI, 51
climate of, Edson, XX, 44
Dettweiler, V, 80
statistics, VII, 143

Dew-point, II, 82
Diabetes, heart in, Weber, X, 315
mellitus, rare in New Mexico, VII, 241
Diarrhœa, climatic treatment, Johnston, VIII, 245
in New York City, Darlington, XI, 112
in phthisis, XIII, 67
Diagnosis, aids to, H. P. Loomis, XIV, 49
failure to make early, F. J. Knight, XIV, 39
in pulmonary tuberculosis, Bonney, XV, 30
Diathermancy of the air, I, 39
Didama, H. D., health-resorts of Mexico, III, 198
sea-voyages, D, VI, 74
lower border of the heart, D, XIV, 65
treatment of malaria, D, XIV, 108
Diet in old age, Taylor, XIX, 231
for gout; uric acid producing foods not deleterious to the gouty subject. XVII, 254
in hemoptysis, Musser, XII, 121
Digitalis, large doses prejudicial in pneumonia, XX, 240
Digestion *vs.* Drugs in the treatment of pulmonary tuberculosis, Fisk XIII, 102
Diphtheria and antitoxin, Brannan, XI, 176
at high altitude in Colorado, VIII, 169
altitudes, Chapman, VI, 206
calomel in, Judd, XIII, 206
calomel in, Judd, XV, 197
Disinfectants for sputum, XXI, 125
Dismal swamp, not malarious, Sir Thomas Watson, XI, 96
nature of, Hinsdale, D, XI, 109
Dispensaries for tuberculosis, XX, 143, 149
for tuberculosis, Otis, XIX, 71
Distribution of phthisis in Michigan, II, 91
in Pennsylvania, map, III, 110, 145
in New York, map, X, 344
of tuberculosis in New Jersey, map, G. Hinsdale, XIV., 179
Dobell, I, 10, 12
Dodge, H. O., acclimation of the consumptive to the climate of Colorado, VII, 183
City, Kansas, XI, 206
Dogs, unaffected by climate, XIII, 57
Donaldson, F., I, 70
address, IV, 1
Donaldson, F., Jr., cardiac failure in high altitudes, causes of, IV, 52
circulatory changes at high altitude, V, 96
effect of altitude on work, D, IV, 41
fallacy of statistics, IV, 93
pneumatic cabinet, experiments, III, 13
Dougan, D. H., mountain fever, III, 191
Draper on hemoptysis, XII, 112
Dress, II, 69
and sensible temperatures, D, X, 373
Drifton, Pa., temperature, rainfall, etc., III, 158
Drug therahy, limitation of, R. H. Babcock, XVII, 1
Dryness and elevation in the treatment of phthisis, Charles Denison, I, 22.
and moisture, X, 143
physical effects of, I, 48

Duckworth, Sir Dyce, XV, 5
Dudley, W. F., the uric acid diathesis and its effect on the upper respiratory tract, XII, 217
Dust, infected, Gardiner, XIII, 133
infectiousness of, Hance, Bowditch, XII, 46
Dyspnœa, cardiac, Loomis, X, 114
in aneurism, Arnold, XVII, 348

Eagle's Mere, Pennsylvania, X, 348; XI, 222
Early hemorrhage, significance of, Moore, XI, 44
Earth, absorbing power of, I, 38
Eastport, Me., climate of, XVII, 73
Ebensburg, Pa., XII, 275
Edson, C. E., Agnes Memorial Sanatorium, Denver, XX, 164
altitude and respiration, D, XVII, 94
climatic treatment, D, XVII, 230
hemoptysis in Colorado, D, XVII, 105
nomenclature in pulmonary tuberculosis, XVII, 174
syphilis and tuberculosis, D, XVII, 153
bacillophobia, D, XVI, 47
small sanatoria, D, XVI, 124
climatology as a study in medical schools, D, XX, 9
tenement house reform, XIX, 147
meteorologic study of the winter of 1903-1904, XX, 44
Edwards, Wm. A., Littoral, California, XVIII, 122
on California, XVII, 82
rheumatism relieved by climate of San Diego, XVIII, 135
Electric arc light in treatment of tuberculosis, Glasgow, XIX, 110
Electricity, static, for gout, XVII, 258
static, for insomnia, J. H. Hance, XV, 141
Elevations, II, 81
Elliott, J. H., climate of Muskoka, XX, 26; XX, 253
out-of-door life,, D, XX, 63
hemoptysis in mitral stenosis, D, XXI, 188
Endocarditis, acute rheumatic, Beverley Robinson, XXI, 162
El Paso, Texas, XII, 281
III, 209; V, 212
Yandell, VII, 95
Elsner, H. L., creosote phthisis, D, X, 281
heart-failure, D, IX, 74
tubercle-bacilli, D, X, 282
empyema, D, XV, 225
treatment of cardiac asthenia of pneumonia, XV, 187
endocarditis, XII, D, 182
serious heart lesions without well marked physical signs, XII, 138, 160
some of the vagaries of croupous pneumonia as seen in central New York, XIII, 192
the association of tuberculosis and syphilis, D, XVII, 151
rupture of the heart, D, XVII, 344.
and W. A. Groat, splenic-myelogenous leukaemia, XVI, 144
Embolism and prognosis in valvular heart disease, W. M. Gibson, XV., 209
Emigration, influence of, on phthisis, I, 19
Emphysema, VII, 35
New Mexico had for, VII, 290
treatment of, M. H. Richardson, VIII, 127
pulmonary valve sound altered in, H. S. Anders, XX, 198

Empyema from a surgical standpoint, J. C. Monro, XV, 220
Endocarditis, mural, Harold Williams and J. Leary, XVI, 178
Engadine, climate of, IV, 137
Roosa, V, 221
English Navy, II, 89
statistics, II, 88
Environment and climate best suited for old age, V, 1
experiment repeated, V, 91
in its relation to the progress of lacterial invasion in tuberculosis, Trudeau, IV, 131
Epilepsy in Colorado, Eskridge, VII, 172
relieved on coming to a lower altitude, Pearce, XVII, 324
Equability, I, 23
Ergot in hemoptysis, XII, 108
in chronic malaria, A. Jacobi, XIV, 95
Errors in treatment of pulmonary tuberculosis, F. J. Knight, XIV, 24
Erysipelas, seasonal influences in, Anders, X, 43
Eskridge, J. T., nervous and mental diseases observed in Colorado, VII, 163
nervo-vascular disturbances in unacclimated persons in Colorado, VIII, 98
Esmarch's observations on infection, V, 105
Estes Park, Colorado, X, 31
XX, 135
European institutions for tuberculosis, XI, 28
Evans, George A., inhaler, IV, 99
Evergreen forests, Loomis, IV, 109
Exercise as a prophylactic and curative remedy, Otis, VIII, 47
fatigue to be avoided, X, 262
in heart disease, Loomis, VI, 253
in phthisis, D, X, 232
Butler, X, 236
von Ruck, VII, 305
in treating gout, XVII, 256
for tuberculosis patients, Minor, XVII, 302
Exercises suitable for children suffering from heart disease, J. Madison Taylor, XVI, 187
Experimental phthisis, X, 11
Expectoration on sidewalk, Colorado law, XIII, 147
Expired air a source of infection, Bergey, XII, 50
Eye, tuberculosis of, Stubbert, XVI, 83

Falkenstein, XII, 30
Sanatorium, XII, 46
plan, XVI, 111, 112
Fallsington, Bucks Co., Pa., temperature, rainfall, etc., III, 152
Family contagion of phthisis, Solly, XI, 14
Fat food in tuberculosis, A. N. Bell, XVI, 163
Fatigue, II, 70
Fever in phthisis, Bonney, XIII, 167
treatment of, Babcock, XIII, 66
Fibrinous bronchitis, J. W. Brannan, XII, 186
Fibroid processes, Denison, VII, 18
Filters, W. D. Robinson on, XII, 195
Finsen, XIX, 111
Fisch, antitubercle serum, XIV, 218
Fisher, W. E., sea-voyages and ocean climate, VII, 282

Fisk, S. A., President's address, XVIII, 1
association of syphilis and tuberculosis, XVII, 153
California climate, D, XVII, 96
Bright's disease rare in the Rocky Mountain region, D, XV, 105
diet in consumption as well as air, D, XV, 29
climate of Colorado, V, 67
Colorado for pulmonary disease, V, 11
Graves' disease, D, V, 90
influenza in Colorado, VIII, 216
meteorological data of Colorado, X, 352
phthisis, analysis of cases, VIII, 71
digestion *vs.* drugs in treatment of pulmonary tuberculosis, XIII, 102
diphtheria with endocarditis, XVII, 406
endocarditis relieved by sodium salicylate, XVII, 406
hemoptysis in Colorado, D, XVII, 105
climate of central Massachusetts, XVIII, D, 24
endocarditis in Colorado, XVI, 185
importance of fresh air, food and light in the treatment of tuberculosis, XIX, D, 99
home treatment of phthisis, XVII, 228
Maine coast, D, XVII, 76
tuberculosis and drink the scavengers of mankind, XVII, 318
"News—Old News," XII, 62
need of information as to Eastern resorts for phthisis, XII, D, 85
notes on Nassau, XIX, 9
return of patients from Colorado; caution, VII, 198
state of the skin, kidneys, etc., at high aititudes, D, VII, 252
100 cases of phthisis treated in Colorado, D, VII, 159
sanatorium treatment, D, XVIII, 184
Flick, L. F., institutions for prevention of spread of tuberculosis, VI, 180
resolution requiring report of cases of tuberculosis to the Board of Health of Philadelphia, X, 287
Flint, Austin, Sr., estimate of Laennec, XIII, 3, 4
Flint, W. H., climate of Santa Barbara, Calif., 14
Florida, freezing weather in Florida, XV, 306
Point Pinellas, XII, 256
pneumonia in, Fremont Smith, XII, 183
J. C. Wilson, II, 115
Point Pinellas, IV, 121
resorts, XI, 201
south central, Keating, II, 124
southern for heart disease, Shurly, XXI, 71
Flügge, XIV, 32, 33
Fogs, high, Santa Barbara, 20
on New England coast, Bowditch, XIII, 25
Food, XV, 104
and diet in sanatoria, Minor, 289
for tuberculous patients, XVII, 186, 196, 197
II, 146
for invalids, VII, 119
in phthisis, II, 68; V, 80; X, 218
Shattuck, IV, 60
malalimentation in rural districts, Gibson, D, X, 146
in phthisis, Fisk, XIII, 102
Forbes, estimate of Lænnec, XIV, 21

Ford, W. E., Adirondacks, IV, 118
cardiac failure in young attendants at asylums, IV, 58
epidemic meningitis, V, 193
influenza in the Mohawk Valley, VIII, 214
sea air, D, IV, 37
seasonal relations of nervous diseases and suicide, D, VI, 86
the element of change, *per se*, in the climatic treatment of disease, IX, 89
Ventnor, V, 68
Forest-air, V, 129
Forests, barriers to winds, V, 131
evergreen, as a therapeutic agent, Loomis, IV, 109
of pine, New Jersey, Platt, VI, 88
Foster, G. W., thermal springs in Salt Lake City, VII, 128
French Lick Springs, Ind., XII, 259
French seaside sanatoria for tuberculosis in children, XXI, 107
Fumigation of apartments occupied by tuberculous patient at health resorts should be under municipal control, C. F. McGahan, XV, 95
Functional cardiac murmurs, A. Jacobi, XV, 240

Gabriel's Sanatorium, at Paul Smith's, N. Y., XI, 30
Galen on cold baths, XX, 74
Garland, G. M., rest in heart disease, D, VI, 266
the pathology of hemoptysis from chronic pulmonary disease, VI, 106
treatment of pleurisy, VIII, 12
Garnett, A. Y. P., Isle of Pines free from phthisis, IV, 119
memorial of, VII, 323
the sanitary advantages of tide-water Virginia, embracing Virginia Beach, as a winter health resort, IV, 80
Gairdner, W. T., transient murmurs, XII, 153
Gardiner, Charles Fox, climatic change in pulmonary tuberculosis, XVII, 202.
dangers of tubercular infection and their partial arrest by climatic influences, XIII, 130
light and air in the treatment of consumption in Colorado, XV, 19
nature of apartments occupied by tuberculous patients, D, XV, 97
measurements of school children in Colorado, XIX, 258
and H. W. Hoagland, human blood pressure as influenced by altitude, XXI, 80
sanatory tent, illustrated, XVIII, 209
treatment of hemoptysis, XII, D, 132, 135
Garrod on gout, XVII, 246
uric acid experiments, XII, 217
Gastric and intestinal disorders in Colorado, VIII, 102
Gaseous enemata, 71
Gavage on phthisis, XVII, 291
Geddings, W. H., Aiken, etc., III, 173
Graves' disease, D, V, 90
leprosy in Charleston, S. C., VIII, 238
Gee, XIV, 9, 10
General principles of management of pulmonary tuberculosis, 124
Genito-urinary tuberculosis, J. C. Munro, XII, 210
Georgia, Bowden Lithia Springs, XII, 257
malaria in, Coleman, D, XI, 107
resorts, XI, 203
renal disease rare in Coleman, D, XV, 103
Georgian Bay, Canada, XX, 36

German institutions for consumptives, XI, 29
Sanatoria, XII, 27, 38
Sanatoria statistics, Pottenger, XXI, 92, 95
Germicide methods in treating phthisis, Wilson, VI, 135
Germs in dust, Colorado, Gardiner, XIII, 134
Gertner's experiments on tuberculosis, XI, 11
Getchell, A. C., bicycling and heart disease, XV, 256
state institutions for tuberculous patients, D, XVII, 232
Geuda Springs, Kansas, 264
Gibson, W. M., febrile endocarditis in the aged, XII, 174
the bearing of embolism on the course of valvular heart disease, XV, 209
Gihon, A. L., U. S. N., athletic exercises in the navy, VIII, 57
beri beri, D, X, 384
cases of recovery from phthisis by out-of-door treatment, X, 252
cholera on steamships, D, X, 104
disposition of sputum, D, VIII, 46
influenza, D, VIII, 221
malalimentation, D, X, 146
measurements of chest, etc., X, 201
rest in phthisis, X, 74
therapy of ocean-climate, VI, 50
Gildea, treatment of hemoptysis, XII, D, 135
Glen Summit, Pa., XII, 276
Glenwood Springs, Colorado, XII, 225
Glasgow, W. C., bichloride of mercury in diphtheria, VIII, 177
creosote in phthisis, large doses, X, 283
physical signs of septic cellularœdema of the lung, etc., X, 398
registration of tubercular cases, X, 324
sign of latent aneurism of the aorta, X, 324
some experiments in the treatment of the pulmonary and laryngeal tuberculosis with the concentrated electric arc light, XIX, 110
contagion of tuberculosis, exaggerated, D, XXI, 128, 141
Glaisher's observations at high altitudes, III, 7
Glycerine, II, 73
Graves' disease, Curtin, XIII, 238
disease, climate an etiological factor of, V, 84
Graphic method of recording lung-disease, Kellogg, VII, 57
Grawitz theory of inspissation of blood, XV, 148
Great Glacier of the Selkirks, XVIII, 176
Great Salt Lake Basin, Standart, VII, 72
Greenville, Alabama, XII, 248
Greenwood Sanitarium, Indiana, XII, 262
Griffith, J. P. C., winds in Colorado, X, 366
Goerbersdorf Sanatorium, XIV, 160
Gout, influence of climate on, C. C. Ransom, XXI, 76
in Colorado, XVIII, 230
spa treatment of, C. C. Ransom, XVII, 245
treatment of, Ransom, XIII, 214
Gouty condition a cause of asthma, XIV, 82
Groat, W. A., and H. L. Elsner, splenic myelogenous leukæmia, XVI, 144
Guiacol, XIII, 17
X, 275
in the treatment of pulmonary tuberculosis, A. Jacobi, IX, 3
for cervical adenitis, Ingals, XII, 72
Gunshot wounds in the Rocky Mountains, XIII, 59
Gymnasium in a sanitarium, VII, 116

Gymnastic exercise, Otis, VIII, 47
Gymnastics, II, 71
in phthisis, Mays, X, 70
Schott method, in heart disease, Babcock, X, 298
and amusements for tuberculous patients, D, XVII, 231
and athletic sports, XIX, 204

Haig *vs.* Hunter, on uric acid in gout, XVII, 247
Halcyon Springs, XVIII, 178
Hance, Irwin H., a single test of the virulency of sputum kept many months, XIV, 212
effects of baths at Hot Springs, Va., XX, D, 70
hydrotherapy in the treatment of insomnia, XV, 137
incipient stage of tuberculosis, XVII, 163, 171
incipient stage of tuberculosis, apparently cured, XVII, 172
infected dust, XIII, 151
treatment of diarrhœa in phthisis, D, XIII, 70
treatment by aquzone XIII, D, 70
tubercular infection of guinea pigs, D, XIII, 71
infectiousness of dust in the Adirondack Cottage Sanatorium, Bowditch, XII, 46
treatment of hemoptysis, XII, D, 136
treatment of tuberculosis by crude tuberculin and modifications, X, 180
climate the first choice in treating tuberculosis, D, XVII, 234
hydrotherapy at Lakewood, D, XVII, 260
home, the treatment of tuberculosis, XVII, 196
Hare, H. A., camphoric acid in night sweats in phthisis, D, XIII, 70
and Holder on aneurism, XVII, 345, 347
Harrington, Mark W., meteorological instruments, D, X, 366
sensible temperatures, X, 368
sunshine statistics, XI, 56
Harris Springs, South Carolina, XII, 279
Hart, J. A., climate in phthisis, XVII, 229
eastern patients in Colorado, D, XIV, 36
infection from the hands in phthisis, D, XIV, 209
treatment of hemoptysis, D, 130, 135
tuberculosis in Colorado, D, XVI, 60
Hartshorne, statistics on pneumonia reviewed, VI, 23
Harvey, Thomas W., care of patients at resorts, D, XVII, 94
foreign bodies in bronchus, XVII, 158
improved ventilation reducing mortality from tuberculosis, XIX, D, 150
treatment of gout by water and diet, D, XVII, 259
Hawaiian Islands, leprosy in, Daland, XIX, 244
Hay-asthma, rare in New Mexico, VI, 23
-fever, V, 180-182; V, 184
-asthma, etc., II, 151
Healing Springs, Virginia, XI, 134; XX, 68
Health-resorts, XI, 189, XII, 247
in Canada, Hinsdale, XVIII, 146
Heart affections in Colorado, Eskridge, VIII, 101
and influenza, Curtin and Watson, IX, 51
-clot and dyspnœa, X, 119
-disease in high altitude, IV, 52
and altitude, Knight, IX, 16
in Colorado chronic, treated by Schott method of baths and gymnastics, Babcock, X, 16

Homes, climate of our, R. H. Reed, VII, 291
Hopkins, T. S., out-of-door life, VI, 203
Hoppe-Seyler, physiologic chemistry, XI, 52
Horses affected by climate, XIII, 56
Hospital for Consumptives, Chestnut Hill, Pa., XII, 44
Hospitals for poor consumptives, J. M. Anders, XIV, 154
Hot-air treatment for gout, Ransom, XVII, 258
dry climate doubtful efficacy of, Darlington, VIII, 234
Springs, North Carolina, XI, 220
Springs, Virginia, Peale, XI, 128, 129
Springs, So. Dakota, XII, 278
Springs, Virginia, Hinsdale, XX, 65
Hotel-keepers and tuberculosis, XV, 97
Houghton, A. S., cabinet, III, 45
How to postpone the degenerative effects of old age, J. Madison Taylor, XIX, 230
Humboldt's observations at high altitudes, III, 8
Hudson, E. D., home treatment, II, 132
obituary, IV, p. xv
Humidity, I, 26
absolute, maps, I, 42
and temperature in relation to disease, Anders, V, 127
relative, tables, I, 43; II, 181
and pneumonia, relations of, J. M. Anders, XX, 214
Adirondacks, N. Y., XX, 39
Denver, Colo., XX, 49
Muskoka, Canada, XX, 31
Santa Barbara, Calif., XX, 2
Hunter's modified tuberculin, X, 181
Hurd, E. P., consumption as I have known it, VI, 182
Hutchins, treatment of hemoptysis, XII, D, 134, 135
Hyde, Dr. Samuel, hot baths unfavorable in heart cases, XVII, 239
Hydrotherapy in gout, Ransom, XVII, 249
and hydrology, Babcock, XVII, 8
in the treatment of tuberculosis, XVII, 299
in the treatment of insomnia, J. H. Hance, XV, 137
Hydrotherapeutics in pulmonary tuberculosis, Knopf, XIII, 119
Hygienic rules for tropical countries, XXI, 37
Hyperpyrexia in altitudes, Keating, IX, 11
Hypodermoclysis in cholera, Daland, X, 62
Hysteria and altitude, Pearce, XVII, 322
in Colorado same as other states, Eskridge, VII, 170
seasonal influences,, V, 134
Ice-bag in hemoptysis, Kretzschmar, VI, 139
Ice in hemoptysis, XII, 117, 127
Ichthyol in treatment of cervical ademitis, XII, D, 77
Idaho Springs, Tenn., XII, 279
Idanha natural mineral water, XI, 139
Idan-Ha springs, table-water, XVII, 258
Idyllwild Sanatorium, Calif., XVIII, 116, 133
Illinois, climate of, Pitner, VII, 203
Perry Springs, XII, 258
Impalpable sputum as a usually overlooked danger in tuberculosis, Norman Bridge, XXI, 120
Impressions of California resorts, Hinsdale, Vol. XIX, 21

Improved, cured and arrested condition of tubercular patients, XVII, 170
Incipient phthisis, Bowditch, XIV, 28
stage of phthisis, XVII, 168
Indiana, Kankakee swamps, malarious, X, 388
Indians, consumption among the, V, 136
phthisis among the, III, 234
and Indian Territory, XIII, 60
Individuality in climato-therapy, VI, 269
In-door life a cause of phthisis, I, 81
Infantile paralysis, seasonal relations of, VI, 79
Infection, V, 93
in phthisis, Ruedi, X, 144
modes of, V, 36
of tubercle, etc., V, 105
B. Robinson, XV, 12
from hands in phthisis, E. R. Baldwin, XIV, 202
Iuflnence of heredity upon the progress of phthisis, S. E. Solly, XI, 9
Influenza in Savannah, Nunn, VIII, 207
in St. Louis, Mulhall, VIII, 197
in Chicago, Ingals, VIII, 184
in Philadelphia in 1889-'90-'91, Curtin and Watson, VIII, 109
in Massachusetts, Monro, VIII, 192
in New York, A. A. Smith, VIII, 202
action on the heart, Curtin and Watson, IX, 51
and prostration, J. H. Platt, 59
and catarrhal fever, Curtin and Watson, VIII, 88
contagion of, D, VIII, 217
a cause of phthisis, XV, 33
epidemic in Philadelphia, 1898-'99, H. S. Anders, XV, 286
its slowing action on the heart, Curtin, XIX, 253
Ingals, E. F., antiseptic treatment and limitation of climatic treatment of pulmonary tuberculosis, XIII, 1
contagion of tuberculosis, D, XXI, 130
functional murmurs, D, XV, 254
respiratory movements of the bronchial tubes, XXI, 152
genito-urinary tuberculosis, XII, D, 216
treatment of cervical tuberculous adenitis, XII, 73
the value of systematic physical training in the prevention and cure of pulmonary tuberculosis, XIV, 40
climate of Denver and mortality from tuberculosis, XX, D, 59
classification of cases of phthisis, D, VII, 168
effects of dry atmosphere on chronic inflammation of the larnyx and nares, VII, 254
influenza, VIII, 184
inhalation and air-pressures, D, VII, 70
insomnia in Colorado, D, VII, 188
laryngeal phthisis, II, 101
syphilitic phthisis, D, IV, 40
thiocol in the treatment of croupous pneumonia, XIX, 185
the Shurly-Gibbs treatment of tuberculosis, IX, 76
wind and disease, D, VII, 23
Inhalations, IV, 98
of creosote, D, X, 251
of sulphuretted hydrogen, IV, 77
Inhaler and inhalants, Ingals, XIV, 47
Inheritance of phthisis, Solly, XI, 13

Intemperance and pneumonia, Townsend and Coolidge, VI, 37
Intermediate altitude for the consumptive invalid, H. P. Anderson, XV, 87
Insanity among negroes, XIX, 130
and influenza, VIII, 114
in Colorado, Eskridge, VII, 174
Insomnia, treatment of, Daly, VI, 246
in high altitude, Swan, XVIII, 229
hydrotherapy for, J. H. Hance, XV, 137
affected by latitude and altitude, Pearce, XVII, 323
Institutions for tuberculosis, Kretzschmar, V, 69
for treating tuberculosis, XI, 28
for tubercular patients, Kretzschmar, VI, 165
Intrathoracic pressure, C. Denison, XVIII, 77
Invalidism at health-resorts depressing, VI, 103
Iodide of potash in asthma, Robinson, VI, 148
Iodine in phthisis, Wilson, VI, 137
Iodine in treatment of phthisis, XIII, 5
Iodoform in treatment of phthisis, Daly, D, XIII, 71
Iron, II, 73
Isles of Shoals, N. H., XIII, 26

Jacobi, A., arterio-capillary fibrosis, D., XIV, 70
ergot in chronic malaria, XIV, 95
infection from the hands in phthisis, D, XIV, 209
blood changes induced by altitude, D, XV, 154
chloroform for children, not ether, D, XV, 225
digitaline, D, XV, 195
climatology as a study in medical schools, XX, D, 11
endocarditis, D, XVI, 185
cardiac degeneration, D, X, 119
guaicoal in the treatment of pulmonary tuberculosis, IX, 3
Lannelongue's cases of tuberculous joint, D, VIII, 67-68
functional cardiac murmurs, XV, 240
mineral waters for skin diseases, D, XV, 117
heart disease and delirium, XX, D, 89
influence of respiration on the heart's action, D, XIV, 79
use of morphia in asthma, D, XIV, 92
reflex causes of asthma, D, XIV, 91
lympatism, D, VII, 260
management of cases of phthisis, D, X, 73
movements of the lung, D, X, 123
quinsy, D, X, 165
Nanheim baths and massage, D, XX, 268
on hemoptysis, XII, 112
remarks on strychnine, XVII, 381
treatment of malaria, D, XIV, 109
Janeway, E. G., endocarditis, XVI, 185
Jarvis, W. C., catarrh, II, 30
Jayne, W. A., diphtheria in Colorado, VIII, 169
influence of altitude upon the sexual organ of women, XI, 120
the climate of Colorado and its effects, V, 55
Jennings, C. G., contagiousness of tuberculosis, XXI, 131
Jews, phthisis among, XIV, 46
Johnson, F. S., nature and treatment of asthma, XIV, 90
Johnson, H. A., modification of tuberculosis by climate, VII, 262
notice of, VIII, 1

Johnston, W. W., climatic treatment of diarrhœa, VIII, 245
contagion of influenza, D, VIII, 218
obituary, XVIII, 267
Journeys for tuberculous patients, XVII, 209
Judd, L. D., hygienics of the skin, XV, 118
calomel in diphtheria, XV, 197; XIII, 206
Mt. Pocono, Pa., as a resort, XII, 78
July temperatures, XI, 67

Kamloops, B. C., XVIII, 180
Kane, Pennsylvania, X, 349; XI, 221
Kansas climate, XI, 206
mineral springs, XII, 263
Keating, J. M., Florida, II, 124
hyperpyrexia in altitudes, IX, 11
reference to his article on inherited phthisis, XI, 11 and 13
Keene Valley, N. Y., XII, 269
Kellogg, J. H., graphic methods of recording diseased conditions of the lungs, and a new form of pneumograph, VII, 57
requisites for a closed sanitarium in Colorado, VII, 107
Kentucky, Eastern, VIII, 80
Mineral Springs, XII, 265
Kenworthy, C. J., Roan Mountain, N. C., V, 114
Kennebunkport, Maine, summer climate of, XVII, 74
Key West, Florida, Shurly, XXI, 77
Kidneys, Bright's disease of, V, 109
Kidney diseases affected by climate, Danforth, XIII, 30
tuberculosis of, X, 190
tuberculosis of, Munro, XII, 213
Kieffer, Capt. C. F., U. S. A., tropical medicine, XX, 3
Kinnicutt, F. P., on hemoptysis, XII, 114
Klebs, antiphthisin, E. Klebs, XII, 76
Klebs', Dr. E., antiphthisin, H. L. Taylor, XI, 74
Klebs, Arnold, C., home treatment of pulmonary tuberculosis, XVII, 206
tuberculin test, XVII, 139
Klebs, Arnold C., dispensaries for tuberculosis, XIX, D, 85
Klebs, A., dispensary treatment for tuberculosis, XX, D, 162
Klebs, A. C., construction and management of small cottage sanatoria for consumptives, XVI, 105
tuberculin test, reaction, D, XVI, 102
recent American contributions to the methods of prevention and treatment of pulmonary tuberculosis, XX, 179
treatment of pneumonia, XX, D, 255
Kneipp, XVII, 6
Knight, F. I., address, I, 2
altitude in affections of the heart, IX, 16
cardiac murmurs, D, X, 89
catarrh, VII, 259
choice of climates, D, IV, 129
climate of Colorado, D, VII, 158
climatic treatment of bronchial asthma, VI, 159
asthma, D, XIV, 89
clinical uses of Röntgen light, D, XIV, 142
common errors of general practitioners in dealing with cases of pulmonary tuberculosis, XIV, 24

choice of a summer residence in New England, XIII, 22
iodoform in phthisis, D, XIII, 72
danger of infecting immune localities, D, VII, 94
heart failure, D, IX, 75
indications and contradictions for altitude in treatment of phthisis, V, 50
legislation in Massachusetts regarding hospital for tuberculosis, D, XI, 38
dispensaries for tuberculosis, nurses, etc., XIX, D, 86
ventilation of tents, XIX, D, 99
early diagnosis of tuberculosis, D, XV, 38-39
prognosis in valvular affections of the heart, D, XV, 186
laryngeal vertigo, XII, 13
malignant endocarditis, XII, D, 181
mountain regions for phthisis, Fisk, XII, 65
resolution as to vivisection, XII, XXVIII
unusually small heart, XII, D, 172
presidential address, VIII, 1
regime in phthisis, D, VI, 204
return of cured tubercular patients from high altitudes, VII, 180
sea-air, IV, 37
lingual tonsil, D, XI, 174
meat diet in rheumatism, D, VIII, 167
New England summer climate, D, VI, 13
opium in hemoptysis, D, VI, 129
the association of tuberculosis and syphilis, XVII, 143
climate and sanatoria for tuberculous patients, D, XVII, 232
shall anything be done by legal authority to prevent the spread of tuberculosis? X, 285
traumatic cardiac neurosis, D, XI, 150
Röntgen-ray examinations, D, XV, 85
voice without larynx, D, XV, 208
value of climate as a cure for tuberculosis, XX, D, 61
what shall we do with patients having pulmonary tuberculosis? XX, 137
Knopf, S. A., ærotherapeutics and hydrotherapeutics in the treatment of pulmonary tuberculosis, XIII, 115
Koch's investigation of cholera, X, 82
tuberculin, X, 169
modified, X, 180
Korsts' experiments on bacilli, XII, 51
Kreozonal, X, p. xiii
Kretzschmar, Dr. Paul, home-treatment, D, II, 76
institutions for the treatment of pulmonary consumption in the United States, VI, 165
pine forests, IV, 118
on Davos, V, 67
public health-resorts *vs.* institutions for the treatment of lacillary phthisis, V, 67-69
statistics from the navy, D, VI, 75
notice of, VIII, 1
Kuetz, treatment of diabetes, X, 320

Lactic acid injections in tuberculous adenitis, XII, 74
Laennec, XIV, 1
Lake Louise, B. C., XVIII, 169
Placid, N. Y., XII, 268
Superior, XVIII, 164

Lakewood, New Jersey, XVII, 193
cold spinal douche at, Robinson, XVII, 235
hydrotherapy at, XVII, 261
Lakewood, dry, XV, 102
New Jersey, XI, 210
Platt, VI, 92
spring-water analyses, VI, 93
N. J., J. H. Platt on, XII, XXIV.
Landouzy, tubercular pleurisy, VI, 2
Langmaid, S. W., linen under clothing, D, XV, 124
changes of the voice in early phthisis, D, XV, 40
Lannelongue, treatment of tuberculous joints, VIII, 66
Laplanders and fat food, XVI, 168
Laryngeal and pulmonary diseases, relation of, F. H. Bosworth, I, 64
phthisis, treatment of, II, 101
Laryngeal vertigo, Knight, XII, 113
Laryngitis, I, 65
chronic, B. Robinson, XI, 170
and rhinitis, effect of dry atmophere on, Ingals, VII, 254
Las Cruces and Las Vegas, N. M., X, 213
Las Vegas, N. M., XIII, 180
Latitude, I, 36
Lawrentians, Canada, A. D. Blackader, XXI, 55
Laveran, X, 391
Lowman, John H., Antituberculosis League of Cleveland, Ohio, work of, XXI, 150
disinfection after tuberculosis, D, XXI, 127
Lead acetate in hemoptysis, XIII, 113
poisoning, waters in, XII, 243
Leaming, J. R., I, 16
climatic treatment, philosophy of, IV, 24
intrapleural pathological products, V, 169
outdoor exercise in phthisis, VI, 203
Leary, J., case of endocarditis, XVI, 178
Lefevre, Egbert, treatment of pneumonia, XIX, 180
Lehman Springs, Oregon, XII, 273
Leibstein, muscular exercise in heart disease, VIII, 54
Leprosy, three cases in one family, Geddings, VIII, 238
in Hawaii and Minnesota, XV, 111
in the Hawaiian Islands, Judson Daland, XIX, 244
in Puerto Rico, XVII, 25
Le Roux, Charles L., the Mediterranean of the United States, IV, 167
Lesley, J. Peter, geology of Pennsylvania, III, 90
Levick, J. J., angina, D, X, 26
contagion of influenza, VIII, 209
early epidemics of influenza, VIII, 209
Grave's disease, D, V, 90
heart-clot in dyspnœa, D, X, 119
heart strain and weak hearts, V, 156
Levison, uric acid, XII, 219
Liberty, Sullivan Co., N. Y., sanatorium at, XI, 31
Libya, Roman resort for phthisis, IV, 111
Light and air in the treatment of consumption in Colorado, Gardiner, XV, 19
effect on skin, XV, 128
loss of, XVI, 34

Medicines in phthisis, II, 72
Mediterranean of the United States as a resort for invalids, IV, 167
Meningitis, epidemic, V, 193
and influenza, VIII, 114
in New Mexico rare, VII, 240
Mental diseases observed in Colorado, Eskridge, VII, 163
influence in causation of hemorrhage, VI, 117
Mentone, Nice, contagiousness of phthisis accountable for increased mortality in, XII, 46
Menstruation in Colorado, VIII, 102
Melancholia treated by climate, Taylor, XIII, 36
and altitude, Pearce, XVII, 322
Meteorology and influenza, H. S. Anders, XV, 286
Meteorologic conditions in the causation of lobar pneumonia, J. M. Anders, XX, 204
study of the winter of 1903-1904, Carroll E. Edson, XX, 44
Mexico, Didama, III, 198
Michigan, phthisis in, II, 99
distribution of phthisis in, II, 91
topography, hydrography, and geology of, II, 92
Milford, Pike Co., Penna., for tuberculous cases, XVII, 190
Milk, a factor in the spread of tuberculosis, J. O. Cobb, XX, 100
and meat of tuberculosis cattle, XIII, 146
diet in phthisis, Minor, XVII, 290
supply of Chicago, XXI, 131
Mineral Springs, waters, American, classification of, Peale, IV, 156
classification, Bell, IX, 96
in malarial diseases, V, 237
in urinary and arthritic diseases, A. H. Smith, V, 229
VIII, 154-168
C. C. Rice, III, 163
geographical distribution of, in United States, Peale, XI, 125
in Salt Lake City, Foster, VII, 128
of Colorado, VI, 212
of North Carolina, X, 124
European and American, partial comparative list, Hinsdale, XVII, 263
report on, by Hinsdale, Peale & Ransom, XVIII, 246
waters in gout, Ransom, XIII, 214
waters, Beverley Robinson, XVII, 235
Mining camps, pneumonia in, XVIII, 232
Minnequa Springs, Pa., XII, 275
Minnesota climate, XI, 207
Minor, C. L., care of patients at resorts, D, XVII, 94
health resorts expensive and unsuitable for poor patients, D, XVII, 234
climatology as a study in medical schools, XX, D, 11
dispensaries and sanatoria for tuberculosis, XX, D, 160
fear of contagion from consumptives, XIX, 150
hot pack in pneumonia, XX, 254
hygienic cure of pulmonary tuberculosis, XVII, 279
nomenclature in pulmonary tuberculosis, D, XVII, 176
nitrogen gas injections, D, XVI, 62
tuberculophobia, D, XVI, 27
tent life for consumptives, XIX, D, 98
the cyrtometer, a neglected instrument of pulmonary diagnosis and prognosis, XIX, 221
susceptibility of negroes to tuberculosis, XIX, D, 130

Miquel's observations on bacteria, II, 90
Mississippi, climate of, IV, 170
Mitral stenosis, Butler, III, 220
Moist surfaces retain bacilli, XII, 51
Molo Kai, Hawaii, XIX, 246
Montana, Peale, D, X, 145
mineral springs, Peale, XI, 132
Montefiore Home, New York, XVII, 199
Monterey Springs, Pa., XII, 275
Montreal, temperature and precipitation, XXI, 61
and Quebec, XVIII, 147
Moore, H. B., altitude and heridity in tuberculosis, etc., VIII, 269
the early recognition and climatic treatment of pulmonary tuberculosis. XI, 41
Morgagni, XIV, 1
Morgan, E. C., obituary notice of, VIII, 1
Mormans, longevity among, VII, 79
Morphia and opium in treatment of pneumonia, XX, 238
in the treatment of asthma, Beverley Robinson, XIV, 87
Mountain fever, IX, 11, 14
fever, Curtin, III, 190
fever, ranges, effects of, I, 37
fever, Swan, XVIII, 227
Mortality in phthisis, lessened, I, 83
Mulhall, J C., hemorrhages in influenza, VIII, 222
influenza in St. Louis, VIII, 197
a case of simple serous recurrent pleural effusion, XI, 141
a case of traumatic cardiac neurosis, XI, 147
Multiple neuritis in Colorado, Eskridge, VII, 172
Munro, John C., epidemiology of influenza, VIII, 172
report of twenty-four cases of acute miliary tuberculosis, VI, 14
D, XV, 254
empyema from a surgical standpoint, XV, 220
Murmurs, subclavian, Curtin, XI, 86
Murray, aneurism, D, X, 330
Muskoka Sanatorium, XVIII, 159
Ontario, Canada, climatology of, J. H. Elliott, XX, 26
Musser, J. H., D, XIV, 35
treatment of asthma, D, XIV, 92
contagiousness of influenza, D, VIII, 215
erysipelas, D, X, 55
institutions for tuberculosis to be outside city limits, D, X, 271
pine forests, D, IV, 117
syphilitic phthisis, D, IV, 39
tuberculosis pleurisy, X, 105
treatment of the final stage of phthisis, IV, 46
whooping-cough, VIII, 8

Nammack, C. E., use of strychnine in heart disease, XVIII, 144
Nantucket, XIII, 26
Harold Williams, XVII, 51
Napa Soda Springs, Cal., XII, 252
Nasal catarrh a cause of phthisis, II, 30
disease, V, 179-184
and cocaine, Bosworth, XI, 139
conservative treatment of, B. Robinson, IX, 61

North Carolina, Asheville, XII, 271
resorts, XI, 220
Roan Mountain, C. J. Kenworthy, V, 114
Southern Pines, III, 214
climate and mineral springs of, Bell, X, 124
North Shore of Massachusetts, Knight, XIII, 23
Norway, tuberculosis in, XVI, 170
Nova Scotia, XVIII, 152
Nuclein and uric acid, XII, 218
Nunn, R. J., influenza in Savannah, VIII, 207
Nurses and tuberculosis, Quimby, D, XVI, 87
Nursing in tuberculosis, XVII, 297

Ocean-atmosphere and consumption, Bell, VI, 70
climate, M. Charteris, VII, 278
W. E. Fisher, VII, 282
therapy of, Gihon, VI, 50
distance from, I, 37
voyages in treating diarrhœa, VIII, 248
bathing, Marvel, XX, 73
climate, H. Williams, XVII, 51
Ocular disturbances due to climatic influence, X, 57
Oedema of the lung, septic, Glasgow, X, 398
Oertel method, VIII, 53
of treating heart disease, X, 299
Oesophageal clicking, Curtin, XV, 206
Ojai Valley, California, XI, 192
Old age, best climate and environment for, Loomis, V, 1
how to postpone the degenerative effects of, J. Madison Taylor, XIX, 230
Oil of cinnamon, XIII, 20
of cloves in phthisis, XIII, 6, 18
Open air treatment, cabin for, R. A. Cleemann, XIX, 101
of tuberculosis in Colorado, XVI, 119
Opium habit in Colorado, Eskridge, VII, 171
in hemoptysis, XII, 113
Orme, H. S., clothing suitable for Southern California, XVIII, 135
Southern California, IV, 143
Orotava, climate of, Gihon, VI, 112
Oroya railroad, South America, VI, 112
Osteo-arthropathy, R. C. Newton and E. Mercelis, XVII, 266
Osler, William, analysis of statistics of mortality from pneumonia, VI, 24
Otis, E. O., antistreptococcic serum in tuberculosis, D, XIV, 227
English hospitals for consumptives, XIV, 155
blood changes induced by altitude, D, XV, 154
early signs of pulmonary tuberculosis, D, XV, 40
fumigation of apartments at health resorts (Cannes), D, XV, 97
climate of the East in winter, XX, D, 58
climatology as a study in medical schools, XX, D, 11
dispensaries for tuberculosis, XX, D, 161
dispensaries for tuberculosis, with a description of the tuberculosis department of the Boston Dispensary, XIX, 71
exercise as a preventitive of phthisis, X, 249
Estes Park, D, X, 41
gymnastic exercise as a prophylatic and curative remedy in chest diseases, VIII, 47

hospital for phthisical patients in an early and late stages, XI, 38
leper hospital in Norway, D, VIII, 244
measurements of chest and lung capacity, X, 199
drainage canula in treating cervical adenitis, illust., XII, 76
resolution as to law in vivisection, XII, XXVIII
the sanatorium or closed treatment of phthisis, XII, 26
home treatment versus climatic treatment of tuberculosis, XVII, 219
notes upon the diagnostic test of tuberculin, XVII, 219
phthisis and density of population, D, X, 350
psychological factor in selecting a climate for invalids, VI, 95
transmissibility of phthisis, XI, 27
immobilization of the lungs, XVIII, D, 87
Massachusetts State Hospital for Consumptives at Rutland, D, XVI, 123
prophylaxis of tuberculosis, D, XVI, 27
New England winds, D, XVII, 76
tuberculin test, D, XVII, 141
president's address, Auenbrugger and Laennec, the discoverers of auscultation and percussion, XIV, 1
treatment of asthma, D, XIV, 94
State Sanatorium in Massachusetts for Consumptives, D, XVI, 58
tuberculin test in cervical adenitis, D, XVI, 103
tuberculin test in syphilis, D, XVI, 104
Rutland Sanatorium, XVIII, D, 23
sanatorium treatment, XIX, D, 144
statistics from the Sharon Sanitarium, XIX, D, 70
tuberculin test, XV, 42
Oregon mineral springs, XII, 273
mineral springs, Peale, XI, 138
Oriental diseases, Bulkley, XV, 111
Organic matter in expired air, Bergey, XII, 55
Osborne, J. W., sensible temperature, XII, 18, 19, 25
Oxygen in heart disease, XV, 193
inhalation in acute affections of the lungs, A. H. Smith, XIV, 149
Oxygenation in lung disease, Reed, X, 218
Oxytuberculin, Butler, D, XIV, 229
Ozone, X, 13; V, 39, 163
C. E. Quimby, X, 332
in forests, IV, 113

Pan-American Medical Congress, Fourth, report of Drs. Curtin and Risley, delegates, XXI, 1
Panama, conditions in; report by Drs. Curtin and Risley, XXI, 1
Pasadena, California, XI, 193
C. H. Alden, XXI, 49-51
Pathological anatomical research, Ruedi, XI, 47
Paul Smith's Adirondacks, new sanitarium at, XI, 30
New York, XII, 269
Peabody, George L., on hemoptysis, XII, 114
Peale, A. C., classification of American mineral waters, IV, 156
mineral springs in North Carolina and elsewhere, X, 145
the geographical distribution of the mineral springs in the United States, XI, 125
sulphur waters, report on, XVIII, 246
Pearce, F. Savary, the influence of climate upon nervous diseases, XVII, 319

Pennsylvania, consumption in, Pepper, III, 88
comparative rarity of phthisis in highlands of, Hinsdale, X, 344
resorts, XI, 221
Society for Prevention of Tuberculosis, X, 285, 294; XI, 34
Penzolot on sanatoria, XVII, 282
Pepper, William, consumption in Pennsylvania, III, 88
environment, D, V, 95
Percussion, XIV, 1
Pericarditis and angina from crushing blows, X, 9
Peritonitis caused by herpes zoster, Curtin, VII, 101
Permanency of results in pulmonary tuberculosis, F. M. Pottenger, XXI, 90
Peroxide of hydrogen, IV, 113
mistaken for ozone, V, 163
Petroleum oil in the treatment of phthisis, W. D. Robinson, XVI, 158
Pearce, F. Savary, obituary note, XX, 5
the nervous cardiac symptoms of high altitudes, XVIII, 196
Pennsylvania resorts, XII, 269
Perry Springs, Illinois, XII, 258
Pershing, Howell T., functional nervous disease in Colorado, XVIII, 229
Phenolic substances, X, 275
Philadelphia, College of Physicians of, registration of consumptives deemed unwise by, X, 287, 294
charts showing density by wards, elevation, etc., III, 110
phthisis in, III, 102
temperature and rainfall of, 1800-1885, III, 150
table showing mortality from phthisis in, by wards, 1860-1885, III, 146
water supply, III, 148
provision for tuberculosis patients in, XIV, 161, 163
tuberculosis in, declining, XIV, 157
winter climate of, compared with that of Denver, Chicago, Boston and New York, Edson, XX, 44
Philosophy of climatic treatment, IV, 24
Phillips, W. F. R., president's address, XXI, page xxiv
atmospheric tempteratures during the month of July, XI, 67
blood changes induced by altitude, D, XV, 156
light in the treatment of consumption, D, XV, 28
relative dryness of Atlantic City and Philadelphia, D, XV, 104
climate of Buffalo, Chicago, etc., XX, D. 62
treatment of tuberculosis by change of climate not always necessary, XX, D, 62
expired air, etc., XVI, 48
meteorology and mortality from pneumonia, XX, 252
meteorology of Augusta, Georgia, D, XVII, 37
sensible temperature, D, XVII, 92
sensible temperature, XII, 16, 24
thermometers, D, XVII, 75
subnormal temperature in phthisis, D, XV, 40
sunstroke, XIII, 223
humidity in California, XVIII, 134
Phipps Sanatorium, Denver, XX, 164
Phlebitis of advanced phthisis, R. G. Curtin, XVI, 126
Phoenix, Ariz., climate of, XVIII, 242-245
fogs on California coast, XVIII, D, 133
Phthisis, absent in Iceland and Faroe Islands, I, 21
among the Indians, III, 234; V, 136
and imigration, I, 19

and malaria, Darlington, XI, 114
and syphilis, Weber, XI, 157
case of cure in Colorado, VII, 202
of recovery, D, X, 252
communicated to wives, VII, 203
contagion and communicability of, X, 292
contagiousness of, III, 108
cough in the last stage, IV, 50
curability of, I, 85
cures of, VII, 185
cured, histological changes, Loomis, VIII, 59
definition of, I, 15
death rate less in closed, greater in open resorts, XII, 30
diarrhœa in, IV, 49
detrimental effect of overexertion, von Ruck, VII, 305
drinking habits condemned, V, 73
dancing injurious, V, 73
etiology of, IV, 3
and pathology of, IV, 3
B. F. Westbrook, I, 5
family contagion, Solly, XI, 14
food in, X, 67
frequent in certain houses, III, 103, 132
gastro-intestinal symptoms, IV, 48
hemorrhage in, VI, 114, 122
heredity of, Solly, VII, 136; XI, 13
home treatment, II, 65, 132
improvement by alimentation, IV, 60
in Boston, III, 112
in Canada, VI, 185
in certain families, III, 134
in Colorado, VII, 212
influence of age, Solly, XI, 17
influence of ocean climate on, Bell, VI, 70
influence of sex, Solly, XI, 17
in Maine, IV, 115
in Massachusetts, II, 66
in Michigan, II, 99
in Pennsylvania, III, 88
in Rhode Island, III 112; VI, 189
in New England, Hurd, III, 111
in New Jersey, relation to density of population, Hinsdale, XIV, 182
infection from hands in, E. R. Baldwin, XIV, 202
pretubercular stage of, H. P. Loomis, XIV, 49
management of patients with, Fisk, XII, 62
oedema of legs in, IV, 47
originating from pleurisy, Bowditch, VI, 1
pain of, IV, 46, 48
prevention and cure by open air travel, H. I. Bowditch, VI, 194
phlebitis in, R. G. Curtin, XVI, 126
pyrexia in, Solly, VII, 136
rarity of, in highlands of Pennsylvania and adjacent counties in New York, Hinsdale, X, 344
recovery from, III, 136, 138
relationship to interpleural products, V, 168

relapse in, Fisk, VII, 201
respiration in, Kellogg, VII, 66
rest in, X, 75
Fisk, VII, 160
relative importance of different climatic elements in treatment of, Bruen, V, 36
slow respiration in, Ruedi, IX, 25
sputum in, Shurly, VIII, 36
spontaneous cure of, XIII, 4
treatment by gymnastics, Mays, X, 70
treatment of Wilson, VI, 132
treatment by antipyretics, II, 76
treatment by blood, defibrinated, X, 234
treatment by cod-liver oil, II, 73; VI, 187
treatment by creosote, VIII, 262; X, 275
inhalations, X, 251
treatment by glycerine, II, 73
treatment by guaiacol, IX, 3
treatment by iodine, VI, 137
treatment by iron, II, 73
treatment by open air travel, VI, 194
treatment by the cabinet, Quimby, IX, 76
treatment by the Shurley-Gibbes method, IX, 76
treatment by tuberculin, von Ruck, X, 169
Hance, X, 180
treatment, institutions, V, 69
treatment, local, IV, 102
treatment of, by increasing vital resistance, V, 94
treatment of convalescent stage of, X, 65
treatment of final stage of, Musser, IV, 46
treatment of, by residence in Colorado as exemplified by the analysis of 141 cases, Solly, VII, 132
treatment of skin, IV, 47
vomiting in, IV, 49
Physical signs, definite records of, C. E. Quimby, XIV, 186
training in the prevention and treatment of pulmonary tuberculosis, E. F. Ingals, XIV, 40
Physique, relation to attacks of phthisis, Solly, XI, 19
Picrotoxin for night sweats, XIII, 67
Piedmont regions and Southern United States, Van Bibber, VII, 47
Pine belt of New Jersey, Platt, VI, 88
forests, IV, 113
Pine Bluff, North Carolina, XI, 221
Pines, Isle of, IV, 119
Pinellas Peninsula, Florida, XII, 256
Pitch of the normal pulmonary valve sound and the practical significance in pneumonia and emphysema, H. S. Anders, XX, 198
Pitner, climate of Illinois, VII, 203
Pittsburg, Pa., mortality from phthisis, 1875-1885, III, 148
Platt, Isaac Hull, acclimatization, II, 104
physics and physiological action of pneumatic differentiation, III, 76
management of phthisical patients at health resorts, V, 121
pine belt of New Jersey, Lakewood, VI, 88
forests, D, IV, 115
prostration following influenza, IX, 59

Platt, W. B., climate of St. Moritz, Upper Engadine, Switzerland, IV, 137
fallacy of statistics, D, IV, 93
influence of climate and season upon the manifestation of normal and abnormal activity, VI, 76
insomnia, VI, 252
Pleural products, V, 168
Pleurisy, treatment of, Garland, VIII, 12
tubercular, Musser, X, 105
with effusion, Mulhall, XI, 141
and angina pectoris, X, 9
in New Mexico rare, VII, 240
is it caused by herpes zoster, Curtin, VII, 101
results in ninety cases with reference to the development of pulmonary phthisis, Bowditch, VI, 1
and tuberculosis, XV, 34
effusion detected by fluoroscope, XIV, 118
Pneumatic cabinet in heart disease, C. E. Quimby, XX, 92
differentiation, II, 53; III, 17, 47, 76
cabinet, IV, 56, 98
experimental studies on circulation and respiration, III, 13
in treatment of phthisis, Quimby, IX, 33
Pneumograph, Kellogg, VII, 57
Pneumonia, I, 84
causation of, Baker, III, 226
chronic interstitial and bronchiectasis, IV, 101
complications of, VI, 35
from influenza, Ingals, VIII, 189
change of pulmonary valve sound, early symptom, H. S. Anders, XX, 198
death rate in, Mays, XIX, 152
complications of, Coleman, XIX, 161
treatment of lobar, XIX, 168
treatment by thiocol, XIX, 185
distribution of, Cobb, XVIII, 54
fluoroscopic appearance of, Williams, XIV, 119
treatment by oxygen inhalations, A. H. Smith, XIV, 151
mortality by races, VI, 38
mortality of, in Massachusetts, General Hospital, 1822-1899, Townsend and Coolidge, VI, 22
mortality by month's chart, VI, 30
inadequacy of the physical signs as indicating the gravity of, A. H. Smith, XVI, 200
in Central New York, Elsner, XIII, 192
in Colorado, Swan, XVIII, 225
in Florida, Fremont-Smith, XII, 183
relation to malaria, B. Robinson, XI, 172
streptococcus, X, 399
treatment of cardiac asthma of, XV, 187
Pocono, Pennsylvania, XI, 222
as a health resort, XII, 78
Poland Springs, Maine, XVII, 75
spring water, analysis of, VI, 93
Portland, Maine, climate of, XVII, 73
Potassium iodide in asthma, F. I. Knight, XIV, 90
Pottenger, F. M., permanency of results in pulmonary tuberculosis, XXI, 90
Potter's asthma in Trenton, N. J., XIV, 183

Rosenquist, blood cells, XV, 146
Roosa, St. John, Davos, V, 221
Ruck, von, C., Asheville, X, 140
contagion of tuberculosis, D, X, 292
contagiousness of influenza, D, VIII, 215
creosote, etc., D, X, 279
defibrinated blood in treatment of phthisis, D, X, 233
detrimental effects of overexercise in phthisis, XII, 305
exercise in phthisis, X, 78
exercise to be regulated, VI, 205
injections of chlorine water in diphtheria, VIII, 175
ozone, D, X, 341
Piedmont section, D, VIII, 87
pneumatic cabinet, D, VIII, 151
treatment of pulmonary tuberculosis with Koch tuberculin, X, 169
tuberculin, D, X, 272
milk and tuberculosis, XX, 109
the clinical value of culture, products of the bacillus of tuberculosis, XIII, 74
use of tuberculin, dangers of, etc., D, X, 196
Ruedi, C., angina, D, X, 27
a comparison of the winter health resorts in the Alps with some places in the Rocky Mountains of Colorado, X, 28
D, X, 143
a peep into the future with respect of pathological researches, X, 47
dryness and moisture, D, X, 143
European springs, D, VIII, 167
exercise in phthisis, X, 77
infection in phthisis, D, X, 144
influenza in Switzerland, VIII, 218
ocular disturbances at high altitudes, especially from snow fields, D, X, 64
slow respiration in phthisis, IX, 25
Ruheman, XVII, 208
Ruppertshain Sanatorium plan, XVI, 111
Rush, Benjamin, as a climatologist, XX, 1
Russell, James B, XIV, 34
Russian Sanatoria, XII, 39
Rutland, Massachusetts, climate of, Getchell, XVIII, 16
XVII, 216, 217, 222

Salicylates in hemoptysis, Mays, XIII, 186
Salt in hemoptysis, XII, 110
Salt Lake Basin, Standart, VII, 72
City, XI, 229
City, sunshine in, XI, 65
City, thermal springs, Foster, VII, 118
San Francisco, climate of, XIX, 22
Sanatoria, cure outside of, C. L. Minor, XVII, 278
definition of, XVII, 280
floating, 37
for consumptives, construction and management of, A. C. Klebs, with plans by J. G. Rogers, XVI, 105
in France, seaside, XXI, 107
for tuberculosis, Rochester, XIX, 60, 145
Sanatorium or closed treatment of phthisis, Otis, XII, 26
at Goerbersdorf, XII, 46
treatment, selection of favorable cases for, E. R. Baldwin, XVII, 178

Sanatory tent, Gardner, XVIII, 209
Sanborn, C. A., the climate of the eastern foot hills of Southern California, XVIII, 89
San Diego, California, XI, 196
Sandwich Islands, VII, 96
Sanitarium, ideal, Kellogg, VII, 128
laboratory in, Kellogg, VII, 121
Sharon, Boston, X, 254
Sansom, A. Ernest, bacillus of tubercle, D, V, 95
Santa Barbara, Cal., XII, 254
C. Halden, XXI, 52
climate of, Flint, XX, 14
Santa Fe, N. M., XI, 215; XIII, 180
Saranac Lake, XI, 218
Saranac, N. Y., XII, 33
Saratoga Springs, New York, XI, 217
life at, XVII, 236
Schauffler, E. W., El Paso, Texas, III, 209
fibrinous bronchitis, XII, D, 193
G. U. tuberculosis, XII, D, 216
School children in Colorado, measurements of, Gardiner, XIX, 258
Schott method of baths and gymnastics in chronic heart disease, Babcock, X, 298
treatment for heart diseases, Beverley Robinson, XVII, 240
Schroeder, H. H., waters of Glenwood Springs, Colorado, XII, 225
de Schweinitz, E. A., some comparative studies of the tubercle bacillus and their importance in relation to tuberculosis in man, XVIII, 39
sero-therapy in tuberculosis, XIV, 216
obituary note, XX, 5; XX, XVI
Sea air, climate, Abbott, VI, 272
Fisher, VII, 282
Gihon, VI, 59
voyages, Charteris, VII, 278
aseptic, IV, 111
diseased conditions in which sea air is of doubtful benefit, B. Reed, IV, 42
effects of, Boardman Reed, I, 51
influence of, on syphilitic phthisis, Curtin, IV, 31
treatment of tuberculosis of the bones and glands of children, Brannan, XXI, 107
Sea baths, P. Marvel, XX, 75
Seashore in insomnia is not always successful, VI, 246
Seasonal and climatic influences on nervous activity, W. B. Platt, VI, 76
relations of apoplexy, VI, 79
relations of chorea, VI, 78
relations of poliomyelitis, acute, VI, 79
relations of suicide, VI, 79
Seasons, I, 37
Sedentary life, I, 80
See, Germain, tubercular pleurisy, VI, 3
Senile heart, Gibson, XII, 174-6
Senn, N., treatment of cervical adenitis, XII, 72
Sensible temperatures, Harrington, X, 368
Solly, XI, 7
temperature, Phillips, XII, 16
Sero-therapy in tuberculosis, J. E. Stubbert, XIV, 214
Serum antitubercle, XVI, 71, 74

Seton Hospital for Consumptives, XI, 31 and 40
Sewall, Henry, altitude and heart disease, D, XV, 170
renal disease and climate, D, XV, 105
altitude in fact and fancy, XVIII, 186
blood count at high altitudes, XVIII, D, 196
an extraordinary case of anthracosis simulating thoracic aneurism, XXI, 190
blood pressure, XXI, 88
communicability of tuberculosis, D, XXI, 140
nephritis and altitude, XXI, 74
recovery from tuberculosis, XX, 61
climate of Adirondacks, XX, 61
pneumatic cabinet, XX, D, 98
sanatorium treatment in Colorado, XVIII, D, 184
Sex, influence of, in predisposition toward phthisis, Solly, XI, 17
Sexual organs of women influenced by altitude, Jayne, XI, 120
Shakespeare, E. O., cholera quarantine, D, X, 104
Sharon Sanitarium, Boston, X, 254
cases treated at, V. Y. Bowditch, XIX, 64
result of treatment in, V. Y. Bowditch, XV, 53
Sanatorium, Mass., XII, 41
Springs, New York, XI, 218
Springs, XVII, 235
Shasta Springs, Cal., XVII, 258; XII, 253
Shattuck, F. C., acclimatization, D, II, 113
home treatment, II, 65
pleurisy and phthisis, VI, 5
phthisis, improvement under alimentation, IV, 60
statistics of pneumonia, D, VI, 48
sulphuretted gas enemata, IV, 79
syphilitic phthisis, D, IV, 38
Shealtiel Springs, Wis., XII, 285
Shurly, E. L., nomenclature in pulmonary tuberculosis, D, XVII, 176
note on contagiousness of tuberculosis, XVII, 312, 318
nasal and neurotic factors in the etiology of asthma, V, 184
hypertrophy, VIII, 35
phthisis in Michigan, II, 91
sputum in phthisis, VIII, 36
control of tuberculosis in Michigan, D, XXI, 138, 143
nature of tubercle bacillus, D, XXI, 126
Southern Florida for chronic cardiac and vascular disease, XXI, 71
-Gibbes, treatment of tuberculosis, IX, 76
method, case treated by, XIII, 4, 5
Siasconset, Nantucket, Mass., climate of, XVII, 56
Sibson on aortic aneurism, XVII, 347
Skin-affections in influenza, VIII, 121
-disease, herpes zoster, Curtin, VII, 101
-disease and climate, L. D. Buckley, XV, 88
hygenics of, L. da V. Judd, XV, 118
in old people, XIX, 232
Skoda, XIV, 8
Slavery and pulmonary consumption, T. J. Mays, 192
Sleep and insomnia in Colorado, Eskridge, VII, 166
Smart, Charles, sensible temperature, XII, 17
Smith, A. A., influenza in New York, VIII, 202
on hemoptysis, XII, 114

Smith, A. H., sensible temperature, D, XII, 24.
on hemoptysis, D, 115
transient murmurs, D. XII, 172
accessory measures in phthisis, D, X, 252
a mechanical device for illustrating the movements of the lung in penetrating wounds of the chest, X, 121
angina, D, X, 26
asthma, D, V, 191
cholera, Bell, A. N., D, X, 102
defibrinated blood in phthisis, X, 234
erysipelas, D. X, 54
the inadequacy of the physical signs as indicating the gravity of pneumonia, XVI, 200
influenza-germs, D, VIII, 220
mineral waters in urinary and arthritic diseases, V, 229
nutrition and exercise in phthisis, D, X, 73
the inhalation of oxygen in acute affections of the lungs, XIV, 149
presidential address, X, 211
registration of tubercular cases, X, 295.
Smith, Frank Fremont, influenza in Florida, D. VIII, 220
pneumonia in Florida, XII, 183
value of Koch's remedy, VIII, 223
Florida as a resort for tuberculous patients, D. XVII, 231
Smith, Governeur, pneumonia in the New York Hospital, VI, 25
Smith, Theobald, variations in pathogenic activity among tubercle bacilli, XIV, 193
Snow, C. N., statistics of phthisis, VI, 189
blockade, XV, 306
Soil, dampness of, I, 81
Solidar pathology, Ruedi, XI, 47
Solis-Cohen, J., I, 59
Solly, S. E., atmospheric changes, VII, D, 235
elevated climates, VII, D, 98
insomnia, VI, D, 251
invalids suited for treatment at Colorado Springs, V, 23
altitude in Colorado, V, D, 67
analysis of 141 cases of tuberculosis treated in Colorado, VII, 132
an invalid's day in Colorado Springs, IV, 173
antiseptics in treatment of tuberculosis, XIII, D, 19
comparative merits of resorts in New Mexico, Colorado, and Arizona, XIII, 171
blood changes induced by altitude, XV, 144
lower levels of New Mexico and Arizona for consumptives, XV, D, 92
bronchiectasis in the tuberculous, XIX, 207
California and Colorado compared, XVII, D, 93
hemoptysis in Colorado, D, XVII, 105
home versus climatic treatment of phthisis, XVII, 229
blood changes in high altitudes, XVI, 204
care in diagnosis of pulmonary tuberculosis, XX, D, 122
climatology as a study in medical schools, XX, 12
discussion of California climate, XVIII, 136
Graves' disease in Colorado, XIII, 245
sunstroke, XIII, 234
treatment of phthisis, D, XIII, 71
heart at high altitudes, D, XVIII, 194
hematogenesis, XII, 11

treatment of hemoptysis, D, XII, 132-135
quoted by Judd on health resorts, XII, 78
laryngitis, D, VII, 260
Manitou Soda Spring, D, XI, 134
open air treatment for phthisis, D, VI, 203
presidential address, XI, 1
sanatorium treatment of tuberculosis in Colorado, XVIII, 182
sanitaria, VII, 125
sanitarium at Colorado Springs, D, VI, 180
treatment of pleurisy by altitude, D, XI, 145
on the invalid fool, XVIII, 228
tents and cabins for out-of-door treatment, XIX, 108, 144
out-door treatment of pneumonia, D, XIX, 183
sailors and consumption, D, XVII, 50
syphilis and tuberculosis, D, XVII, 151
use of strychnine in heart disease, XVIII, 145
South Carolina resorts, XI, 224
Harris Springs, XII, 279
South Dakota, Hot Springs, XII, 278
Southern California, observations on, S. A. Fisk, XVII, 80.
Southern Pines, North Carolina, XI, 221
Bell, III, 214
Spa physicians, characteristics of, Beverley Robinson, XVII, 241
treatment, clinical aspects of, Beverley Robinson, XVII, 235
treatment of gout, C. C. Ransom, XVII, 245
Spas, European and American, comparative list of, Hinsdale, XVI, 263
Sphygmograph in heart-disease, X, 302
Spirometer, Denison's, VII, 8
Spittoons, XVII, 186
Splenic-myelogenous leukæmia, H. L. Elsner and W. A. Groat, XVI, 144
Spontaneous rupture of the heart, R. G. Curtin, XVII, 340
Spread of tuberculosis, sputum from ambulant cases, the main factor, Rochester, XXI, 135
Springs, thermal, in Salt Lake City, Foster, VII, 128
Sputum a source of infection, Bergey, XII, 56
a danger in tuberculosis, Bridge, XXI, 120
the main factor in spread of tuberculosis, Rochester, XXI, 135
in consumption, Shurly, VIII, 36
rules for disposal of, XVII, 292
cups for, XVII, 299
virulence of old, I. H. Hance, XIV, 212
St. Agathe, Canada, view near, XXI, 58
meteorology of, XXI, 60, 62
St. Augustine, Florida, pneumonia in, F. F. Smith, XII, 184
St. Luke's Hospital, New York, care of consumptives, XI, 37
St. Moritz, X, 29
climate of, IV, 137
St. Paul, Minnesota, XI, 207
Standart, A. C., Great Salt Lake Basin, VII, 72
Stanford, Jr., University, XIX, 24
Statistics, fallacy of, D, IV, 93
Sternberg, Laverau's, discovery, V, 239
Stethoscope, history of, II, 170
Stimulants in heart disease, XV, 193
Stomach conditions in early tuberculosis, Boardman Reed, XVI, 134

Stubbert, J. Edward, a plea for an accepted nomenclature with reference to the classification of pulmonary tuberculosis, XVII, 161
infection from the hands in phthisis, D, XIV, 210
some statistics upon serotherapy in tuberculosis, XIV, 214
X-ray examinations, XIV, 143
intra-pleural injection of nitrogen gas in tuberculosis, D, XVI, 62
Loomis Sanatorium, expenses and entertainments, XVI, 124
subsequent histories of patients apparently cured under administration of antitubercle serum, etc., XVI, 74
sanatoria for tuberculosis, D, XIX, 86
tent life for consumptives, XIX, 88
ventilation of tents, D, XIX, 99
Streptococcus pneumonia, X, 398
relative value of the fluoroscope and fluorescent screen, D, XV, 85
Strümpell, tubercular pleurisy, VI, 3
Strychnine, caution as to overuse of in pneumonia, XX, 241
evils of, R. G. Curtin, XVIII, 139
remarks on, A. Jacobi, XVII, 381
Subclavian murmurs, R. G. Curtin, XI, 86
Suggestions: the result of recent experience with phthisical patients, V. Y. Bowditch, XIV, 28
Suicide, seasonal relations of, VI, 79
Sulphur waters of Richfield Springs, Ransom, VIII, 154
report on, A. C. Peale, XVIII, 246
Guy Hinsdale, 256
Summerville, South Carolina, XI, 226
Sunlight cures, XVII, 5
deficient, I, 77
in treatment, II, 71
for asthmatic patients, D, XIV, 91
hygiene of, XIV, 233
Solly, XIII, 176
on sputum, Colorado, XIII, 148, 151
Sunshine, I, 41
in Colorado, V, 16; XX, 44-50
recorders, XI, 57, 61
statistics, Harrington, XI, 56
and rain at Santa Barbara, Cal., XX, 19
at Muskoka, Canada, XX, 31
in Adirondack Mountains, XX, 41
Denver, Colo., XX, 51
Buffalo, N. Y., XX, 51
Philadelphia, XX, 54; XX, 44-50
Sunstroke almost unknown in Colorado, VII, 179
case reported by Eskridge, due to artificial heat, at Pueblo, VII, 180
Phillips, XIII, 223
Swan, W. H., danger from sputum, D, XXI, 132
impressions of practice at low and high altitudes, XVIII, 222
Swiss sanatoria, Otis, XII, 37
Syphilis and sulphur waters, D, VIII, 166
in heart and lung diseases, Weber, XI, 151
in Scotland, XV, 112
and tuberculosis, F. J. Knight, XVII, 142
and the tuberculin test, E. O. Otis, XVII, 122
in negroes, D, XIX, 130

Syphilitic affections of the heart and the aorta, Leonard Weber, XIX, 47
phthisis benefited by dense air, VI, 115
Curtin, IV, 31

Tachycardia, Curtin, XIII, 238
Tadousac, Quebec, Canada, XVIII, 154
Tampa, Florida, XI, 202
meterology, XII, 257
Tappeiner on expired air in phthisis, XII, 51
Tarpon Springs, Florida, XII, 257
Tate Epsom Spring, Tenn., XII, 280
Taylor, H. Longstreet, clinical results from the use of tuberculin and its modification of antiphthisin (Klebs) in pulmonary consumption, XI, 74
intra-pleural nitrogen gas injections in tuberculosis, XVI, 61
tuberculin test, D, XVI, 102
Muskoka Sanitorium, Ontario, Canada, D, XVIII, 181
pneumonia in cold climates, 253
Shurly-Gibbes treatment of tuberculosis, IX, 89
sputum and tuberculosis, degree of contagion, D, XXI, 133
Taylor, J. Madison, aneurism of the heart, D, XVI, 198
exercises suitable for children suffering from heart disease, XVI, 187
climate or environment as a factor in the repair of neurasthenia and melancholia, XIII, 36
Maine, climate, XIII, 27
physical training in heart disease, D, XII, 157
Taylor, M. K., southwestern Texas, V, 209
Temperament to be consulted in choosing resorts, VI, 96
Temperature, I, 35
and humidity in relation to disease, V, 127
isotherms, II, 80
mean annual, in Pennsylvania, (map), III, 88, 95
effects of change of, J. M. Anders, XX, 209
in Philadelphia, XV, 295, 306
Adirondacks, N. Y., XX, 39
Denver, Colo., XX, 47
Muskoka, Canada, XX, 31
Santa Barbara, Cal., XX, 21
of mineral springs, Peale, XI, 134
ranges of, II, 81
study in tuberculosis, Minor, XVII, 296
winter of 1903-4, Edson
Temperatures at Panama, XXI, 16
in July, Phillips, XI, 67
sensible chart, Harrington, X, 368
Tennessee mineral springs, XII, 279
resorts, XI, 227
Tent life for consumptives, J. Edward Stubbert, XIX, 88
sanitary, in treatment of tuberculosis, Gardiner, XVIII, 209
Terebene, V, 162
Terpine, IV, 113, V, 164
Tetanus in Puerto Rico, XVII, 23
Texas cattle, XIII, 53
Fort Elliott, XIII, 59
El Paso, XII, 281
El Paso, Schauffler, III, 209

resorts, XI, 228
southwestern, V, 209
western, Yandell, VII, 81
Thayer, W. S., pulmonary osteo-arthropathy, XVII, 273
The Thousand Islands, St. Lawrence, XVIII, 157
Therapol, X, p. xii
Thermal waters, Guy Hinsdale, XVIII, 261
Thomasville, Georgia, XI, 205
Geddings, III, 173
Thomson, Wm. H., on hemoptysis, XII, 115
Thorax, immobilization of one-half, Charles Denison, XXI, 201
Throat disease, treatment of, B. Robinson, IX, 61
quinsy, treatment of, Brannan, X, 151
Toboga Island, Panama, XXI, 34
Tonsil, lingual relation to cough, B. Robinson, XI, 161
Tornado, XV, 304
Townsend, C. W., mortality of acute lobar pneumonia, VI, 22
Tracheotomy, and intubation in diphtheria, Brannan, XI, 182
Travelling in the open air a cure and a prevention of phthisis, H. I. Bowditch, VII, 194
Treatment of phthisis, V, 36
comparative importance of climatic attributes, V, 44
of tuberculosis, institutions for, Hinsdale, XI, 28
in institutions, V, 69
Trudeau, E. L., XIV, 159
work at Saranac, XII, 33
cabinet, III, 41
environment in its relation to lacterial invasion in tuberculosis, IV, 131
experiments repeated, V, 91
institutional treatment for tuberculosis, VI, 168
tuberculin, IX, 18
modified, X, 181
Tubercle bacilli, XII, 47, 51
bacillus, comparative studies of, E. A. de Schweintz, XVIII, 39
bacilli, variations in pathogenic activity among, Theobald Smith, XIV, 193
Tubercular infection, danger of, Gardner, XIII, 130
kerato-iritis, illustration, XVI, 83
meningitis in Colorado, Solly, D, VII, 181
pleurisy, Bowditch, V, 2
Musser, X, 105
patients cured in Colorado, Knight, VII, 189
sputum, danger of, Bridge, XXI, 120
Tuberculin at Adirondack Cottage Sanatorium, XXI, 93
X, 263, 271
and antiphthisin (Klebs) in consumption, H. L. Taylor, XI, 74
at the Adirondack Cottage Sanitorium, Trudeau, IX, 18
Fremont-Smith, VIII, 223
von Ruck, X, 169
XVI, 66
test in the diagnosis of pulmonary tuberculosis, J. M. Anders, XVI, 89
test, W. E. Casselberry, XVII, 128
E. O. Otis, XVII, 121
action stimulated by theobromin, XVII, 139
test, E. O. Otis, XV, 42

Tuberculosis, V, 37 (see phthisis)
acute miliary, Monro, VI, 14
and pleurisy, Garland, VIII, 12
comparative rarity in the highlands of Pennsylvania, and the adjacent counties in New York, Hinsdale, X, 344
of bones and glands treated by sea air, XXI, 107
in the Eastern State Penitentiary, Philadelphia, Hinsdale, XXI, 100
absent in cattle, Rocky Mountain region and plains, XVI, 42
problem in Colorado, S. G. Bonney, XVI, 49
and the community, Beverley Robinson, XIX, 133
clinic of the Health Department of New York City, Darlington, XX, 143
department, Boston Dispensary, Otis, XIX, 71
early recognition and climatic treatment of, Moore, XI, 41
in criminals, W. D. Robinson, VII, 262
in criminals, Hinsdale, XXI
notification of cases in Michigan to Board of Health, X, 285
diagnosis by the Röntgen light, XIV, 121
in Philadelphia declining, XIV, 156, 167
prevention of, E. F. Ingals, XIV, 40
sero-therapy in, J. E. Stubbert, XIV, 214
genito-urinary, Munro, 210
prophylaxis against, Bergey, XII, 50
in California, XVII, 91
food in, XVII, 186, 196
home treatment of, XVII, 181
Hance, XVII, 196
State institutions for, XVII, 232
in California, cures of, XVII, 204, 220
contagiousness of, E. L. Shurly, XVII, 312
and syphilis, F. I. Knight, XVII, 142
hydrotherapy in, XVII, 198, 299
in the negro, Coleman, XIX, 122, 132
is it caused by milk? J. O. Cobb, XX, 100
of the kidney, case of, X, 190
pretubercular condition, Lyndale, VIII, 180
prevention of, by legal authority, Knight, X, 285
point of election in pulmonary, Cobb, XVIII, 50
relation to environment, IV, 131
report of Royal Commission, XI, 33
Shurly-Gibbes treatment, IX, 76
sanatoria for, Rochester, XIX, 60
treatment by the electric arc light, Glasgow, XIX, 110
tuberculin test in, J. M. Anders, XVI, 89
treated by intra pleural injections of nitrogen gas, D, XVI, 61
Tuberculous adenitis, E. F. Ingals, XII, 71
meat and milk a source of infection, XI, 32, 33
patients in California, Edwards, XVIII, 130
Tucson, Arizona, XIII, 180; XII, 103
Turban's Sanatorium, statistics, XXI
Turk's Island, phthisis in, Bell VI, 70
Turpentine, IV, 109
as a remedial agent, Walker, XIII, 107
Tyndale, J. H., II, 89, D, II, 123
diathesis as a basis of cure, D, VIII, 70
hemorrhage in phthisis, D, VIII, 76

injections of chlorine-water for tonsillar diphtheria, D, VIII, 175
the pretubercular condition, VIII, 180
treatment of phthisis, D, VIII, 151
Tyndall's experiment on watery vapor, V, 130
Typhoid fever in New Mexico, VII, 241
fever in high altitudes, Swan, XVIII, 227
Tyson, James, uric acid in urine of the new-born, XII, 219

University bars, Morgan, XIV, 45
Urea, elimination of in high altitude, XVIII, 232
Uric acid and gout, XVII, 246
acid diathesis and its effect on the upper respiratory tract, W. F. Dudley, XII, 217
Urinary analysis in heart disease and nephritis before and after treatment by baths, X, 314
diseases, mineral waters in, V, 229
Utah, Castilla Springs, XII, 282
climate and resorts, XI, 229

Van Bibber, W. C., D, IV, 94
contagion of influenza, D, VIII, 219
Point Pinelos and Colorado Beach, California, IV, 121
the climate of the greater Piedmont regions of the Southern United States, VIII, 77
value of mineral waters in malarial diseases, V, 237
Vapor tension, II, 82
Tyndall's experiment in watery, V, 130
Vaporizer and sterilizer, VIII, 150
Variability *vs.* equability, Tandell, VII, 89
indicative of dryness, I, 44
of climate, I, 23
Ventilation, deficient, Denison, XVI, 29
Kellogg, VII, 111
Ventnor, V, 68; XI, 28
Vermont, Burlington, XII, 282
Victoria glacier, XVIII, 170
Hospital for Consumptives, XI, 29
Vineyard Haven, meteorology of, XVII, 53
Virchow, XV, 115
Virchow's cellular pathology, XI, 49
Virginia Beach, IV, 80
Hot Springs, XI, 128-129
Hot Springs, climate and waters, G. Hinsdale, XX, 65
Vision in influenza, VIII, 115
Vital capacity, H. P. Loomis, XIV, 50, 53
Vivisection, action on proposed laws, XII, XXVII
Vomiting in phthisis, IV, 49
Von Jaksch, uric acid in the blood, XII, 217

Walcott, Massachusetts, State Board of Health, and the registration of cases of tuberculosis, D, X, 296
Walker, J. B., aneurism of the heart, D, XVI, 198
Asheville and migration to various resorts, D, X, 141
case of acute miliary tuberculosis, VI, 20
climate and renal disease, XV, 99
linen mesh clothing, D, XV, 124

diet in rheumatic and gouty patients, D, XVII, 258
foreign body in the bronchus simulating pulmonary phthisis, XVII, 155
difficulties of climatotherapy, XII, 1
genito-urinary tuberculosis, XII, 215
oil of erigeron in hemoptysis, XII, D, 137
Richfield Springs, D, XIII, 221
turpentine as a remedial agent, XIII, 107
distribution of phthisis, D, X, 351
gaseous enemata, IV, 78
latent syphilis, VIII, 166
nitroglycerin in pneumonia, D, XV, 195
prognosis in heart lesions, D, XV, 184
registration of cases of tuberculosis, X, 294
treatment of malaria, D, XI, 118
treatment other than climatic, of hemoptysis, VI, 122
sunlight for asthmatic patients, D, XIV, 91
tuberculosis in New Jersey, D, XIV, 184
Walters on sanatoria, XVII, 281, 282
Walton's classification of mineral waters, IV, 157
Waburg's tincture in malarial asthma, Beverley Robinson, XIV, 81
Ward, S. B., exercise in heart disease, D, VI, 267
influenza germs, VIII, 213
Water a vehicle for malaria, Daly, X, 391
in hot climates, method of cooling, Darlington, IX, 23
supply and malaria, Newton, XI, 92
for a sanatarium, Kellogg, VII, 112
filters, W. D. Robinson, XII, 195
from Mt. Pocono, Pa., XII, 86
Waters of Glenwood Springs, Colo., XII, 225
Watson, E. W, action of influenza poison on the heart and a study of influenzal angina pectoris, IX, 51
epidemic influenza in Philadelphia, VIII, 109
influenza and catarrhal fever, VIII, 88
Warm Springs, Va., XX, 68
Waukesha Springs, XI, 131
Watteville, de, W. A., cabinet, III, 35
Weber, Leonard, angina and pseudo-angina, D, X, 26
erysipelas, D, X, 54
on some pathological conditions of the heart in diabetes and their relations to diabetic coma, X, 314
dampness and lack of ventilation favoring tuberculosis, D, XVI, 25
home treatment of pulmonary tuberculosis, XVII, 181
hospitals for tuberculosis, D, XIX, 83
quinsy, D, X, 166
registration of cases of tuberculosis advocated, D, X, 295
syphilis as a factor in diseases of the heart and lungs, XI, 151
syphilis and etiology of atheroma, XII, 148
syphilitic affections of the heart and aorta, XIX, 47
use of various altitudes in treating phthisis, D, XV, 92
Weight, loss of, in racing, XV, 271
Westbrook, B. F., I, 5
Bergeon's treatment, D, IV, 74
bronchial tubes and lungs, local treatment of, IV, 95
etiology of phthisis, D, IV, 22
pine forests, D, IV, 116
relation of heart disease to altitude, IV, 55

West Baden Springs, Indiana, XII, 260
Westchester, Pa., rainfall, III, 151
Western life for consumptives, Fisk, XII, 67
Whitney, H. B., Colorado the best sanatoria, D, XVII, 232
Whittaker, J. T., conditions which tend to render climate aseptic, V, 100
gaseous inhalations, IV, 77
pneumatic cabinet, IV, 59
Whooping cough, Musser, VIII, 8
Wilkesbarre, Pa., temperature, rainfall, etc., III, 159
Wilks, Samuel, value of drugs, XVII, 237
Williams, C. Theodore, data of hemorrhage at high altitudes, VI, 114
141 cases of phthisis treated in Alpine Sanatoria, VII, 133
statistics on phthisis, XI, 16
Williams, Francis H., an outline of the clinical uses of the Röntgen light, XIV, 111
Röntgen ray examinations in incipient pulmonary tuberculosis, XV, 68
Williams, G. A., acute tuberculosis and typhoid fever, VI, 21
Williams, Harold, anæsthetics for children, D, XV, 224
effects of violent exercise upon the heart, XV, 267
functional murmurs, D, XV, 254
and J. Leary, case of mural endocarditis, XVI, 178
gulf stream, D, XVII, 50
Nantucket and the ocean climate, XVII, 51
Williams, H. F., II, 53; III, 17
cabinet, IV, 56
gaseous enemata, IV, 75
hypophosphites in phthisis, D, VIII, 67
life in Maine and New Hampshire, D, IV, 117
muscular exercise, D, VIII, 56
the injustice of regarding means for treating phthisis as attempts to discover a specific cure, VIII, 145
Williams, Whittredge, inheritance of tubercle-bacilli, XI, 11
Wilson, J. C., presidential address, XX, 1
climate and Bright's disease, V, 109
Florida, II, 15
infectiousness of phthisis, D, IV, 268
consumption in Colorado, D, XVI, 59
rest and exercise in heart disease, D, VI, 268
sea air, D, IV, 38
treatment of pulmonary phthisis, VI, 132
tubercular pleurisy, D, X, 112
need of institutions for the treatment of tuberculosis patients, D, XVII, 233
nomenclature in reference to pulmonary tuberculosis, D, XVII, 175
syphilis favoring the progress of tuberculosis, D, XVII, 153
Wilson Springs, North Raymond, Maine, XII, 265
Wind storms in Colorado, Swan, XVIII, 229
Winds and pneumonia, J. M. Anders, XX, 220
New York, Philadelphia, Buffalo, Chicago and Denver, XX, 55
II, 80
Yandell and Greely, VII, 90
Wind velocity and direction in Philadelphia, XV, 298
Winter Park, Florida, XI, 201
of 1903-1904, study of, C. E. Edson, XX, 44
temperatures in Denver, 1904, Edson, 48
temperatures in New York, XX, 45

Winternitz, XV, 148
Wisconsin Springs, XII, 284
Wise, A. Tucker, climate of Ajaccio, VII, 271
Wolfer's Mineral Spring, Oregon, XII, 273
Women, respiration in, Kellogg, VII, 58
Wood, Horatio C., action of strychnine, XVII, 381
Worcester, Massachusetts, climate of, XVIII, 13
Worries and anxieties of tuberculous patients, Minor, XVII, 305
Wroth, James H., climate of New Mexico, VII, 285

X-ray burns, XIV, 147
clinical uses of, XIV, 111

Yandell, W. M., New Mexico, Arizona and Western Texas, VII, 81
Yellow fever at Panama, XXI, 25
fever in Puerto Rico, XVII, 22
Yellowstone Park Springs, Peale, XI, 131

Zuntz on blood cells, XV, 148